SEP 30 1916
UNIV. OF ILL.

Telephony.

THE AMERICAN TELEPHONE JOURNAL

PUBLISHED EVERY SATURDAY.
TELEPHONY PUBLISHING COMPANY.
VOLUME 71, No. 14.

CHICAGO, SEPTEMBER 30, 1916.

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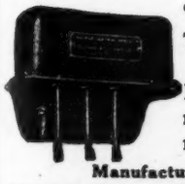
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THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY
MONADNOCK BLOCK, CHICAGO

H. B. McMEAL, PRESIDENT AND EDITOR. H. D. FARGO, SECRETARY AND TREASURER. J. C. KELSEY, VICE-PRESIDENT AND FINANCIAL EDITOR.
S. R. EDWARDS, MANAGING EDITOR. J. R. HASTIE, VICE-PRESIDENT AND ADVERTISING MANAGER.

Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1897

Volume 71
Number 14

CHICAGO, SATURDAY, SEPTEMBER 30, 1916

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada; $5 Other Countries

A Shoe That Fits Two Feet.

Did you know that Attorney General Gregory, of the United States Government, had rendered a definition of the Bell telephone combine? Probably not, for the attorney general himself didn't know it.

September 19, he filed a brief in the United States Supreme Court, appealing from a decision in favor of the Reading Co., which the government is prosecuting as "the backbone of the monopoly of anthracite coal."

In this brief the chief law officers of the United States said: "This combination has a history permeated with illegality and characterized by a deliberate purpose to drive others from the field."

This is an exact definition of the Bell telephone organization, and some day the Department of Justice will employ similar phrases in punishing the Bell-Western Electric combine for its unfair, irregular practices.

A New Bell Dodge.

The Bell-Western Electric alliance is working a new game among the Independent telephone men of Ohio. Many Independent companies accepted as true the announcement that the Bell factory would not seek business outside the Bell ranks, and were glad to be rid of the harassing tactics employed by the Bell interests to squeeze an order from an Independent buyer. In two Ohio cities the Bell emissaries have made a proposition to the local Independent companies substantially as follows:

"We can't supply your needs just at present but will be able to do so in 18 months or two years. Now, you are in the market for some equipment. We are sorry we cannot supply it right now, but if you will agree to wait until we are prepared to fill your needs, we will have our traffic engineers come here and give you temporary relief and at a nominal charge. In other words, if you will hold this order for us until we can fill it, we will see that your present needs are cared for."

As a dog-in-the-manger policy, this proposition of the Bell factory certainly caps the climax. As an example of downright hoggishness, it is entitled to first place. It is a mean, petty action. It rightfully belongs in the brain of the man who was so mean that he grew a wart on the back of his neck so he wouldn't have to buy a collar button.

In the keenest competition in ordinary business, if one dealer cannot supply a buyer with what he wants within two years, he doesn't dream of trying to "crab" the other fellow's game by urging that buyer to hold off from buying for years. Only an organization operating on the Bell policy would have the arrogance to plant itself with both feet in the trough and, while not able to gorge itself any more, selfishly prevent others from feeding. It is the height of swinish greed.

We had a letter this week from the manager of an Independent telephone company in Minnesota in which he said: "Enclosed you will find two letters we received from the Western Electric Co. which will prove that it is not giving up the business of Independent companies—yet. We have had letters from them all summer regarding a sample telephone set that they sent us last spring without any order."

These letters from the Bell factory are dated August 26 and 28 and solicit orders for poles, cross arms, wire and pole line hardware. One of the letters, besides enclosing an order blank, referred to the sample set shipped without authority.

Information also comes in that a Western Electric salesman was at Galesburg, Ill., August 12, also at Kewanee, and stated that his instructions were to call on garages, light plants, and telephone companies. On August 23 a Bell factory salesman was at Washington Court House, Ohio, soliciting Independent business. The same day a Bell man was at Mineral Point, Wis., and said he was after all the telephone business he could secure. The following day another Bell factory salesman was at Bedford, Ia., pushing his wares.

Reports also state that a Western Electric man was at Hut-

sonville, Ill., and made the announcement that he had never been notified not to solicit Independent business. Other cases of Western Electric activities in Independent territory are: Oblong, Ill.; Noble, Ill.; South Haven, Mich.; Caldwell, Ohio; Rochelle, Ill.; Lafayette, Ind.; and Otterville, Mo.

Within the last two weeks the Western Electric Co. has shipped from its Minneapolis house sample telephones to Independent companies at Max and Hillsboro, N. D. It also sent these companies contracts covering their purchase of telephones for one year, with a request that they sign them. The Bell factory is also selling telephones at Cavalier, N. D.

This is no doubt cheering news to Bell licensee companies that cannot get deliveries on equipment they are forced to buy from the Western. No wonder the licensees are gnashing their teeth over this situation. They are forced to wait for needed equipment while the Bell factory fills war contracts and browses around in the Independent field.

Reports also show that a Western Electric salesman was at Atkins, Ark., recently and sold some cable and line equipment. He did not land the switchboard order which went to an Independent manufacturer. The Bell salesman said he did not figure on the board, as he could not make deliveries.

At Elk Grove, Cal., however, the Western salesman tried to sell a magneto board to the Elk Grove Mutual Telephone Co. to replace a common battery board, and a few days before that two Bell solicitors solicited that Independent business and assured the local manager that the Western could supply additional drops and cords for the Independent board then in use. The same pair visited Roseville, Cal., and told the local manager they would take his old board off his hands if he would buy a new one from the Bell factory.

The Fisher (Ill.) Telephone Co. was visited by a Western representative who solicited its trade. In Ohio a Bell factory salesman called on the Independent companies at Olive Hill and Grayson, and sold the latter exchange a 60-line board. At Thomaston, Ga., a Western salesman solicited the local company for business, and sold an order for magneto telephones and material. Paducah, Ky., also reports the arrival of a Western Electric salesman who wanted Independent business knowing that the Bell licensee orders were "sewed up."

From Dallas, Tex., comes the information that Bell operating men at Plainview and Tulia are working hard to induce the Independent company at Happy, Tex., to buy a Western switchboard and falsely declaring that the Independent manufacturer who is competing for the job will be owned by the Western Electric Co. within a year. This is a sample of the Bell tactics to divert Independent business to the Bell factory. At Beverly, Ohio, the Independent telephone company received a Western telephone recently and returned it unopened.

All these bits of news show that the Bell interests are still in active collusion to obtain Independent business by hook or crook. Independent telephone interests should not relax their efforts to bring the Bell-Western Electric alliance to book for its unfair competitive methods.

What Has Become of You?

By HERBERT KAUFMAN

What ever did become of you? We've searched through the Bankers' Year Book, Moody's Manual, The Congressional Directory, Dun and Bradstreet, The Medical Guide and "Who's Who," but your name isn't listed.

Perhaps, after all, you changed your mind and went in for a partnership. What's your concern? Maybe you're a distinguished efficiency expert or a great engineer.

You failed?—nonsense! It doesn't seem possible. How did it happen? You say that the world doesn't appreciate true talent; that there's no chance for a man without a pull?

That's enough; the puzzle is solved; you've given the answer. It's clear now. You didn't try. You never delivered. You placed too much reliance on your natural strength and wouldn't train for the fight.

You cheated yourself of the chance to organize your abilities and the world won't let you disorganize its systems. Conceit flattered you and exaggerated the value of mere intelligence. You got into the habit of learning just enough to brass by and it stuck; now they've called you and you're not there.

You sought the best in life without offering the best in yourself. Only the spectacular phases of affairs appealed to you. You bit at this and that and digested nothing.

Look back! Your record is strewn with half-developed ideas, intrinsically sound propositions, but all of them abandoned in mid-course when the novelty of the enterprise wore off.

You're undisciplined. You can't handle others because you won't handle yourself. Go up to West Point and watch the cadets prepare for their future responsibilities. See them undergo all the duties which they will later on direct. Obedience is preparation for command. You wouldn't obey in your youth and so you must be ordered about now.

You'll spend the rest of your days filling odd jobs—a drifter; too headstrong and opinionated to acknowledge your faults; deluded with self-esteem—criticising society for the recognition of delinquencies to which you blind yourself—watching commonplace persons gradually mount in influence because they do appreciate the importance of steadiness. Life is hard for all who are too easy on themselves.

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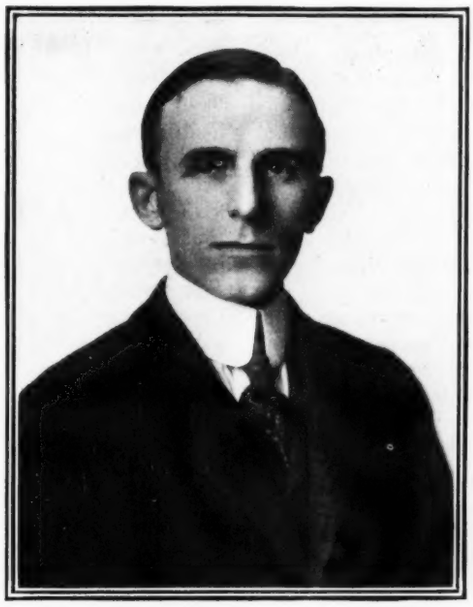
Acoustics as Applied to the Telephone Instrument

Discussion of Sound and Its Production—The Human Voice and the Ear—Clearness and Loudness—Transmission Tests—Results Under Different Sending Conditions—Paper Presented at Annual Convention of Indiana Independent Telephone Association

By Ray H. Manson,
Chief Engineer, Stromberg-Carlson Telephone Mfg. Co.



Of the many methods of conveying intelligence from one person to another, sound in the form of articulate speech is the most satisfactory. It is for this reason that the telephone has outstripped all other methods of transmitting over distances.

The transmission of sound, and especially speech, faithfully and without too much distortion, is the first mission of all telephone systems. The mechanical production of these sounds must be correct, and the getting of the sounds into direct contact with the telephone transmitter diaphragm must be done with intelligence. Otherwise the highest developed apparatus and circuits will fail to give a satisfactory reproduction at the distant end of the line.

It is not to be expected that the telephone will correct defects in the speech of the person talking or make amends for the deficiencies in hearing on the part of the listener. However, the incorrect use of the telephone, especially in the failure to have the speech actuate the diaphragm to best efficiency, can be corrected by educating the user.

Mere instructions to do a certain thing, without giving the full reason for them, usually fail to convince the average American. Thus our carefully worded and explicit instructions—"Place the lips close to the mouthpiece and speak in a firm tone of voice"—are seldom heeded. If such instructions are supplemented by a campaign of education, giving logical reasons for doing a thing, our American public will respond with more grace and the desired ends be attained.

As sound is the basis of telephonic transmission, we must know the subject intimately, to instruct others. And it behooves everyone connected with the industry, whether manager, troubleman, or inspector, to study the fundamentals of solund and their relation to the telephone.

Fundamentally sound is the result of a state of vibration, a fact that we know from experiment. It requires energy to cause a body to vibrate. But once these vibrations are produced, they are taken up readily by the air and transmitted to the human ear, which in turn vibrates and through the nerves and brain produces the sensation of sound.

In the production of sound, it is found that all vibrating bodies have a definite period of vibration, called a natural period, although we can make these bodies vibrate faster or slower than their natural periods by forcing them. These results can be likened to the swinging of a pendulum of a large clock—the time of making a complete swing or period depends on the length of the pendulum and for each length there is a definite period. Very little power is required to drive the clock pendulum at its natural period of vibration, yet the period can be changed by using sufficient power, such as grasping the pendulum by hand and swinging briskly at any desired rate.

The same can be said of the harmonic type of party line ringer. When the ringing current is in step with the natural period of vibration of the tapper rod, the bell will ring with a very small amount of actuating current. However, if the ringing current is of sufficient magnitude, it need not be of the same frequency as that of the ringer tapper rod, as the natural period will be overcome and the ringer be operated. In this case the vibrations are forced and the period is unnatural and the ringing irregular.

The diaphragms of transmitters and receivers have natural periods of vibration, but can be easily caused to vibrate at other rates. This tendency of diaphragms, or other mediums, to vibrate more readily at certain natural periods than for other periods, augments or magnifies some of the tones so as to impair the quality of the resulting sound. In the case of the telephone diaphragms, this tendency can be largely overcome by damping through pressure of a spring on the diaphragm center or through other similar means.

There are two kinds of sound, which are made known by the effect on the ear—noises and musical notes.

If we consider a musical note as any sound which produces a particularly agreeable sensation to the ear, then a noise is sound lacking this function. Noises are the result of a complicated set of vibrations in which the body may not vibrate as a whole in any definite period—as in the case of the pendulum—but in parts, some of these vibrations acting in a different direction so as to confuse others, while some adding their effects to others.

A simple experiment to show the relation of noise and musical notes can be easily made by holding a piece of cardboard against a toothed wheel. Now if the wheel is revolved slowly, but uniformly, a sound will be given out every time a tooth of the wheel passes the edge of the cardboard. At very low speeds, we get sharp clear clicks which are not agreeable to the ear. These sounds can be considered as noises and so long as there are less than about 16 clicks per second, the ear has no difficulty in distinguishing one click from another.

Noises and Musical Notes.

By increasing the speed of the toothed wheel so that more than 16 clicks occur in each second, the noises blend and become a low hum. This is a musical note. If the speed of the wheel is further increased, the musical note gets higher in tone, although not louder. Now if it were possible to increase the speed of the wheel so that the teeth vibrate the cardboard at the rate of 30,000 to 35,000 per second, it would be hard to distinguish whether a

musical note was produced or a dull, metallic thud.

The tone of middle C on a piano has a period of about 256 vibrations per second. It is interesting to note that the sound of the cricket is about the upper limit of audibility. The human voice ranges well within the limits of 65 to 1,044 vibrations per second as subsequently explained. This degree of tone, or number of vibrations per second, is called the pitch and should be distinguished from the volume or loudness as the latter depends upon the amplitude or extent of the vibrations.

A good example of loudness is found in the case of a telephone bell or gong. If it is struck lightly with the end of a pencil, it gives off a sound of a certain loudness which we can just distinguish across the room. Now if the gong is struck harder with the handle of a pocket knife, the edges of the bell will vibrate to a greater amplitude and give off a louder note, although the pitch or rate of vibration per second will remain as before. It is much easier to give a large amplitude of movement to slowly vibrating bodies than to the fast vibrating ones. Thus the lower tones are often heard for greater distances than higher tones.

There is another property to a musical note, or articulate speech, which enables us to distinguish between different kinds of musical instruments or between the voices of different individuals. This is known as the timbre or quality. This peculiarity of sound is due to the presence of other vibrations than the one which we distinguish as the main vibration.

The Human Voice.

This brings us to the consideration of the human voice, which is nothing more than the sound produced by the vibrations of the vocal cords in the throat. Voice is not speech, as the latter is the production of articulate sounds intended to express ideas. Lower animals have voice without speech in the sense that man has these faculties. Then there is speech without voice, as in whispering and voice without speech, as in singing the scale of musical tones.

Voice is produced when air is driven by the lungs through the tubes leading to the throat so as to strike against the vocal cords. The scheme can be likened to the stretching of two elastic bands of sheet rubber, over the end of a wide tube, so that the inside edges of the bands just touch each other. The bands will represent the vocal cords and the tube the windpipe. Now if we attach a pair of good bellows to the lower end of the tube, so as to send a powerful blast of air against the rubber bands from the inside, the pressure will force out the inside edge of the rubber, open the aperture, and allow air to escape. This will cause a fall in the pressure of air and the bands will close together. Again the pressure will increase and the edges of the bands be forced out, the action being repeated rapidly so long as the pressure of air is maintained, resulting in a musical tone.

The pitch of this tone would be represented by the number of vibrations per second. It could be varied by increasing or decreasing the tension on the edges of the rubber bands by stretching tighter over the end of the tube or reducing this tension. The intensity or loudness of tone would vary with the amplitude or extent of vibration of the edges of the rubber bands, just the same as in the vocal cords.

The vibrations producing sound vary in different animals according to the structure of the organs and the power the animal has over them. In man the movement of the tongue and lips enables the modifying of the vocal sounds to an almost indefinite extent. Ordinarily speaking, the tones of the voice have nearly all the same pitch and the variety of sounds is due rather to the action of the mouth organs than the definite movements of the vocal cords.

In men, the vocal cords become more elongated than in women in the ratio of 3 to 2, giving the male voice a lower pitch which is usually stronger. In advanced life, the upper notes of the register are gradually weakened, and disappear, owing to the loss of elasticity in the vocal organs.

Historical records show voices as low as 42 vibrations per second and as high as 2,048 per second. This low note is not much above the pitch at which it is possible to perceive musical tones, 32 per second. The highest note which is within the range of the human ear is 73,768 vibrations per second. This is a total of 11 octaves in the musical scale which are within the hearing of a healthy ear.

The quality of the human voice depends on the same principles that govern the timbre or tone quality produced by any musical instrument. The fundamental or musical tones produced by the vocal cords are either strengthened by the resonance of the air passages or mixed by being compounded by a number of partial tones which sometimes strengthen the fundamental or obscure it.

With this brief description of the production of various sounds which must be handled in telephonic transmission, it is well to know how sound is transmitted through space.

We put energy into a body to cause it to vibrate and produce sound. But in order to cause the sensation of hearing, we must have an intervening medium to transmit this energy. All gases, liquids and even solids convey sound in the form of vibrations. Some of these mediums are better transmitters than others, in that they do not absorb as much energy while en route; also some mediums transmit the energy faster than others, as for example most metals transmit faster than the air or any of the gases. Air will transmit sound about 1,100 feet per second at ordinary temperatures, while iron transmits it 17,400 feet in the same time.

Every transmitting medium through which sound travels, has a weakening effect upon the sound transmitted. Also a sounding body sends out its vibrations in all directions, the vibrating waves having a tendency to become spherical in shape, so that the sound can be heard in every direction from the point of production.

Having considered the production of sound and articulate speech and the propagation of these vibrations, it is not out of place to know a little about the construction of the ear. The sensitiveness of the ear, as well as its capability of detecting a wide range of sound vibrations, has much to do with the carrying on of a successful telephonic conversation.

The Construction of the Human Ear.

The two projections on the sides of the head, commonly known as the ears, have but little to do with hearing. In the case of the telephone, this flexible cartilage covered with skin, serves to make a more or less close fit to the telephone receiver cap, so as to concentrate and direct the sound from the receiver diaphragm to the inner or true ear. The latter is embedded in the hardest bones of the body, called the "stony bones," so as to serve as a secure protection for a most complicated and sensitive organ.

The passage from the outside to the inner ear is about one inch long and terminates in a membrane stretched across the end. This membrane is tough and elastic and perfectly responsive to all sounds unless it is penetrated or broken by disease or concussion, caused by loud noises like explosions. When thus impaired, hearing is interferred with or totally destroyed.

Behind this first membrane is a cavity called the "middle

ear" or ear drum, due to its similarity to an ordinary drum. The inside of this drum is filled with air which is maintained at the same pressure as the outside air by a passage connecting with the throat. Thus, if the mouth is opened when loud explosions occur, the pressure will tend to equalize on both sides of the diaphragm or membrane and the tissue be less liable to rupture.

If this passage, from the inner ear to the throat, is closed by catarrh or other similar disorders, the air inside may become absorbed and the pressure of the outside air will force the membrane in so as to decrease the hearing or actually cause deafness.

The middle ear or drum is connected to the real organ of hearing, known as the "inner ear," by three small bones popularly designated the hammer, anvil, and stirrup, because of their resemblance to those objects.

The sound waves entering the outer ear cause the membrane to vibrate, which in turn transmits these movements through the three small bones in succession to the nerves in the inner ear, which go to the brain. It is believed by some that these nerves in the inner ear, which number a few thousand, are so constituted that each one will respond to a particular vibration period. Thus if a pure tone is produced, as by a tuning fork of definite pitch, one certain nerve will be caused to vibrate, the sensation of this sound being carried to the brain.

A harmonic chord would cause the several nerves which correspond to the vibration periods of the bodies producing the harmony, to act. A noise might cause all of the nerves to act, resulting in confusion and an unpleasant sensation.

The Nerves of the Ear.

It is estimated that there are from 3,000 to 4,000 of these nerve terminals in the normal ear. The number of these nerves is dependent upon the state of physical health of the person as well as on the age. Thus we can expect that persons having trained and healthy ears will be able to carry on telephonic conversations over longer distances and with greater transmission handicaps, than is possible with the average telephone subscribers. It is this same difference in individuals that brings up the important question: Which is best to accentuate, loudness or clearness, in telephone transmission?

Transmission to be of value, must convey to the telephone user, complete intelligence. Clearness, therefore, is the first consideration. If all telephone conversations could be conducted in sound-proof booths to exclude room noises, then clearness with but little volume would be preferable.

Inasmuch as the best commercial results require that all telephone instruments in an exchange be of uniform design and performance, we must take into account the average requirements of all subscribers and so balance the clearness and loudness that all conditions will be served.

The matter of clearness versus loudness probably will always remain a question for debate. Individually we may not be competent to pass judgment for all of the telephone users in a particular exchange, by our personal tests or through conversations, for our range of hearing may be too great, or possibly it may be less than the average. If transmission tests are to be made of real service to the majority of subscribers, then a number of observers must be used and an average taken of the results.

This subject does not contemplate the considering of the distortions and losses in speech due to line and apparatus conditions, but we can lay emphasis upon the necessity for talking directly into the transmitter mouthpiece. If the telephone transmitter is made sufficiently microphonic so as to respond readily to speech when the lips are several inches from the mouthpiece, then this sensitiveness will become a detriment in many telephone locations where room noises are plentiful. The confusion caused by these foreign noises, superimposed on the desirable transmission, will make conversation less intelligible.

Simple Transmission Tests.

Simple tests can be made to determine the amount of transmission obtained when the sound is made at different distances from the rim of the transmitter mouthpiece. A device producing a uniform tone within range of average voice frequencies, was placed at different distances from the mouthpiece of a non-microphonic type of a modern transmitter and standard artificial cable adjusted in the circuit so as to represent the loss due to talking with the lips at these distances, zero cable being taken when the sound was produced at the mouthpiece rim. At one-half inch distance there was a loss of transmission equivalent to 3.6 miles of standard artificial cable; at one inch a loss of 11 miles and at one and one-half inches, a loss of 17 miles of cable. Then for this non-microphonic transmitter, fully one-half of the available commercial transmission is lost by having the sound produced one and one-half inches from the mouthpiece. This is taking the limit of commercial transmission at 32 miles of cable.

These same tests, made with a microphonic type of modern transmitter, showed less losses for the same distances, 3½ miles of cable for one-half inch; 5½ miles for one inch and 8 miles for 1½ inches and only 11 miles for two inches.

The actual figures obtained on the foregoing tests will vary with the frequency and volume of the sound, but about the same ratio of results will hold good, so that we are safe to make deductions as follows:

Deductions Relative to Transmission from Telephones.

That both the non-microphonic, and the microphonic types of transmitters, require that the lips of the speaker just clear the rim of the mouthpiece for maximum transmission.

That the loss in transmission is about twice as much for the non-microphonic transmitter as for the microphonic one, when speaking at a distance of 1½ inches from each.

That the greater sensitiveness of the microphonic transmitter allows more room noises to be taken up and interfere with the clearness of the transmission.

And finally, that when comparative tests are made with two telephones—one equipped with a non-microphonic transmitter and the other with a microphonic transmitter—it is imperative that the persons doing the talking have the lips exactly the same distance from the mouthpiece for each instrument. A variation of only one-half inch in this distance would mean a loss of 3½ to 7½ miles of standard artificial cable for or against one of the transmitters. When we consider that the difference in the efficiency of two types of modern transmitters seldom amounts to over four miles of standard artificial cable, this error in conducting the test would make the results absolutely worthless.

Every operating company is striving to better the transmission in its particular system by expensive changes in switchboard, line circuits, and substation equipment. In many cases the saving in loss due to such improvements amounts to only a few miles of standard artificial cable. By educating the subscribers to talk with the lips practically against the rim of the transmitter mouthpiece, we can make additional savings, equivalent to several miles of standard artificial cable, and at no cost, outside of that of an instructive campaign of education.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25, 1915—Part III, Telephone Accounting and Auditing, by James H. Shoemaker, Completed January 15, 1916—Part IV, Telephone Finance, by J. C. Kelsey and S. R. Edwards, Completed June 3, 1916—Installments Now Being Presented Comprise Part V, Telephone Advertising and Publicity, Written by Roy D. Mock

Quiz Questions on the Preceding Installment.

75. Why is the advertisement of Fig. 58 a good one? State some of the good points of the advertisement reproduced in Fig. 59.

76. Discuss the value of the Independent Shield as a trademark.

77. What should be borne in mind in preparing advertising copy appealing to farmers?

78. What argument has been used to draw in new subscribers?

CHAPTER VIII. New Business Advertising (Continued.)

79. *Direct Mailing and Its Efficiency.*—In recent years a great movement has begun toward the use of the mails in advertising. The argument in favor of direct mailing pieces is quite apparent. One can reach only the people he wants to reach. He can start on as small a scale as he likes, getting out only one or two letters a day if desired, and he can conduct such advertising without any knowledge of its reaching into the camp of the enemy—at least not until the campaign is well under way. It is the gumshoe method of going after business.

Obviously, the efficiency of a direct mailing campaign depends upon two things: First, the accuracy of the mailing list; and, second, the effectiveness of the matter sent out.

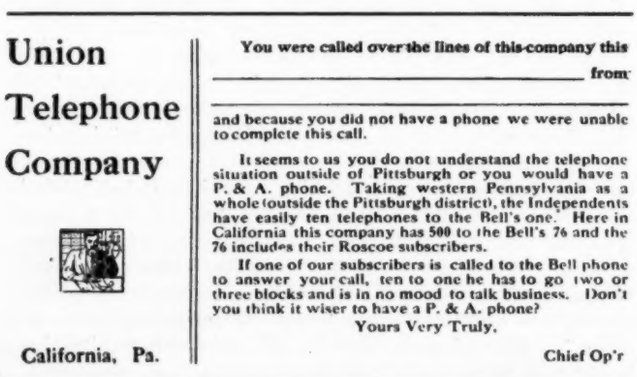
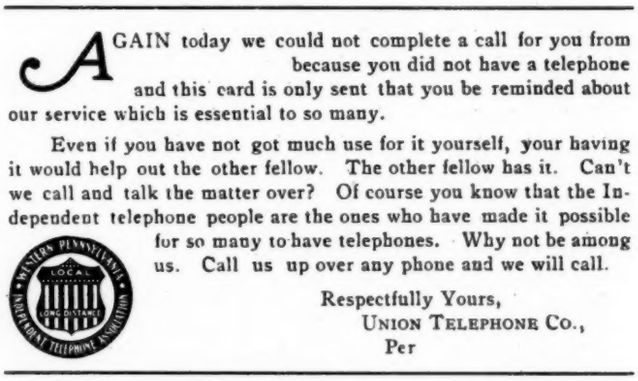

Union Telephone Company
California, Pa.
You were called over the lines of this company this
from
and because you did not have a phone we were unable to complete this call.
It seems to us you do not understand the telephone situation outside of Pittsburgh or you would have a P. & A. phone. Taking western Pennsylvania as a whole (outside the Pittsburgh district), the Independents have easily ten telephones to the Bell's one. Here in California this company has 500 to the Bell's 76 and the 76 includes their Roscoe subscribers.
If one of our subscribers is called to the Bell phone to answer your call, ten to one he has to go two or three blocks and is in no mood to talk business. Don't you think it wiser to have a P. & A. phone?
Yours Very Truly,
Chief Op'r

Fig. 65. Competitive Talk on Postal Card.

80. *Newspaper Advertising and Direct Mailing.*—In localities where there are no local newspapers, or where the local newspaper does not reach the right class of people, there is no doubt about the usefulness of a direct mailing campaign. It is about the only kind of effective advertising the manager of an exchange in such a community can call to his aid.

To circularize broadcast in larger communities is impractical because of the tremendous expense involved. Newspaper advertising is the thing in cities, although a newspaper campaign can be supplemented by direct mailing to a carefully selected list. Such a list, however, should contain only names of people who can afford telephones, but who do not have them. To compile a list of this kind is ofttimes so expensive that the use of it is impractical.


AGAIN today we could not complete a call for you from because you did not have a telephone and this card is only sent that you be reminded about our service which is essential to so many.

Even if you have not got much use for it yourself, your having it would help out the other fellow. The other fellow has it. Can't we call and talk the matter over? Of course you know that the Independent telephone people are the ones who have made it possible for so many to have telephones. Why not be among us. Call us up over any phone and we will call.

Respectfully Yours,
UNION TELEPHONE CO.,
Per

Fig. 66. Personal Solicitation by Mail.

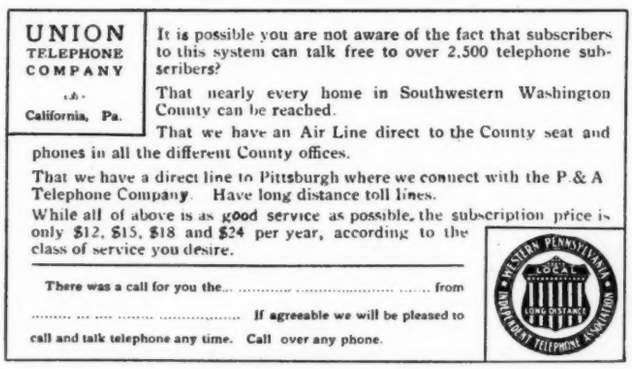
81. *Toll Calls and a Direct Mailing Campaign.*—An effective little series of cards is submitted which was used by the Union Telephone Co. of California, Pa. One of these cards which contains some very good competitive talk is reproduced in Fig. 65. Another which embodies good personal solicitation is shown in Fig. 66. Undoubtedly these cards are used indiscriminately for the purpose of notifying people of calls which they might have received had they been Independent subscribers. In Fig. 67 is reproduced another card of this same series. It also contains the same argument that the recipient of the card might have received a certain telephone call if he had been an Independent subscriber.

It may easily be imagined that not very many of these cards have to be received by a person before he begins to realize that perhaps he is missing something by not having an Independent telephone. Such a campaign has a tendency to make him more dissatisfied than ever with a Bell telephone and more eager to install the Independent service. Note the prominence of the Independent Shield on two of these cards.

It takes only a moment to fill out one of these cards and the publicity thus secured—even though no direct business whatever be traced to it—is certainly worth the small investment. The one trouble with the use of such an argument as that presented is that at first glance people are likely to be prejudiced against the company when they receive such a card. Somehow they unconsciously feel that the telephone company is taking an unfair advantage of them. There is no particular reason why this should be so but, unless the wording of the card is worked out very carefully and tactfully, this is likely to be the impression.

The writer is inclined to believe that Fig. 67 is the most tactful of the series. The main story is about the services rendered by the Union Telephone Co. The fact that it was impossible to complete a certain telephone call is brought in only incidentally.

82. *Developing New Business Through Personal Letters.*—In going after new business through the mails, the personal letter will be found an effective form of advertising. Going after business with personal letters is a great deal like going


UNION TELEPHONE COMPANY
California, Pa.

It is possible you are not aware of the fact that subscribers to this system can talk free to over 2,500 telephone subscribers?

That nearly every home in Southwestern Washington County can be reached.

That we have an Air Line direct to the County seat and phones in all the different County offices.

That we have a direct line to Pittsburgh where we connect with the P. & A Telephone Company. Have long distance toll lines.

While all of above is as good service as possible, the subscription price is only $12, $15, $18 and $24 per year, according to the class of service you desire.

There was a call for you the..... .... from .... If agreeable we will be pleased to call and talk telephone any time. Call over any phone.

Fig. 67. Another Competitive Talk and Solicitation Card.

hunting with a rifle—each shot must be made to count. And because personal letters must be adapted to fit the situation at hand, it is almost as difficult to make suggestions regarding their use as it is to teach, by mail, a man to be a good hunter or fisherman.

In general there are three ways that personal letters can be used in any commercial enterprise to secure or help secure business:

1. The letter can be expected to stand on its own bottom and to bring back direct business.

2. The letter can be designed to prepare the mind of the prospect so the business can be more easily closed by personal solicitation than though it had not been preceded by such a letter.

3. It can be used after a personal call to help clinch the business and make it easier to secure another interview.

Frankly, the writer is of the opinion that very few contracts can be closed by mail. About all that can be done is to prepare the way for personal solicitation. Convincing a man that he ought to subscribe for the service of a certain telephone company can be done by mail—but getting him to sign a contract for such service usually requires a personal touch.

83. *Use of Personal Letter to Supplement Personal Solicitation.*—Another way in which personal letters can be used very effectively in going after business is in following up the calls of personal solicitors—and every telephone exchange must do personal solicitation of some kind or other. If a corps of solicitors is not employed, at least the manager, himself, makes

Dear Sir:

In the interview which you so kindly granted Mr. Jones, our representative, this morning, emphasis was laid upon the fact that the Home Telephone Company has 500 subscribers in Smithville, whereas the Bell company has only 300.

There is undoubtedly only one reason for this situation. It is that the Home company affords better service. In having a telephone installed you undoubtedly want the service that will enable you to talk to the greatest number of people.

We are endeavoring to give the people of this community a telephone service of which they can be proud. We believe it is due in no small part to our efforts that telephone rates are as reasonable as they are. The history of the telephone business throughout the country has been that the Independent companies have been the cause of the lowering of rates.

The Home Telephone Company is owned and managed by local interests. In other words, it is a Smithville institution and as such we believe is entitled to local support.

We should like very much to have you for a subscriber to our service and assure you that your patronage will be appreciated. If you will sign the enclosed form, a telephone will be installed for you at once and your name will be inserted in our forthcoming directory.

In readiness to serve, we are,

Yours truly,

Fig. 68. Suggestion for Letter to Supplemet Solicitor's Call.

certain calls with a view of obtaining contracts for new installations.

One form of such letter is shown in Fig. 68. Such a letter can be signed by the manager or by the person who actually made the call. It serves to review the facts set forth in the

Dear Sir:

As a man interested in local affairs, you may be interested in the fight which is being waged by the Home Telephone Company against the Bell monopoly.

You may have thought that this is simply a local issue, but it is not. All over the United States, Independent companies, closely banded together by their associations, are fighting against a competitor which is financed and controlled by Wall Street. And we believe the fight is going very much our way. For instance, here in Smithville the Home Telephone Company has 500 subscribers, whereas the Bell has only 300. Two years ago the Bell had 500 and the Home Telephone Company had 300.

The only reason you have telephone service is that you may talk to the greatest number of people in the shortest period of time. And our only purpose in writing you this letter is to tell you that you can do this by becoming a subscriber to the service of the Home Telephone Company.

The history of the telephone business throughout the United States has been that the Independent companies, of which the Home Telephone Company is one, have been instrumental in reducing rates, thus increasing the number of telephones in use. The result is that the telephone has now become a necessity instead of a luxury as in its early days.

Our rates are the same as the Bell rates and we give you more for your money because we have more subscribers and you, consequently, have more points to which you may talk.

We are endeavoring to render a telephone service of which the people of Smithville can be proud, and believe we are succeeding. Your co-operation as a subscriber would be very much appreciated. If you will drop into our offices, we shall be very glad to tell you more or, if desired, the writer will be glad to call.

Yours truly,

Fig. 69. Letter for Soliciting Subscribers of Opposition Company.

interview and will make it easier for the solicitor to get attention again.

Naturally, as local conditions vary so greatly, this letter cannot be used verbatim. It is intended simply as a guide.

There is no doubt that the sending out of a letter modeled

along the lines of Fig. 68 will serve a beneficial influence. It will keep the name of the company before interested prospects, and will tell the complete story perhaps in a more concise form than would be possible in the course of a conversation.

84. *Use of Letters to Obtain Subscribers from Opposition Company.*—It has always seemed to the writer that one of the most prolific fields for an Independent telephone company would be to go after Bell subscribers in the territory served. Practically any printer can turn out imitation typewritten letters. And if a letter could be compiled which would tell the Independent story concisely and to the point, and this letter be sent out to Bell subscribers, it would certainly be pounding the enemy in his own camp.

Subscribers to any telephone service are usually people who can afford it. Go after them in a tactful way without arousing their antagonism and business is sure to result—particularly if the campaign be persisted in, for like newspaper advertising, it is folly to expect one letter to do the work.

A suggestion as to how such a letter can be worded is given in Fig. 69. The argument, however, may have to be changed to conform to local conditions.

(To be Continued.)

A Novel Form of Newspaper Publicity.

A recent issue of the Seymour (Ind.) Weekly Republican contains a story of "The Awakening of Betty, or the Pageant of the Telephone," into which is woven, in a most interesting manner, the history of the Seymour Mutual Telephone Co., of which L. C. Griffitts is president. The Modern Girl, the heroine of the story, which is written in the form of fiction, had just completed the last chapter of "The Settler's Homestead." Settling back in her comfortable chair to reflect upon the life of the pioneer as portrayed in the story and gazing into the fire which is burning brightly, she pictures in the flames the scenes of "The Settler's Homestead."

The Modern Girl picks up the telephone and calls "Pioneer 1-8-1-6 and is soon engaged in conversation with the hero of her story. After considerable questioning from the Pioneer, she tells him of the invention and early history of the telephone and then goes on to describe the system operated by the Seymour Mutual Telephone Co. and to explain the operation of a telephone and a telephone switchboard.

The Seymour telephone system, the Modern Girl relates, was purchased by L. C. Griffitts and his associates in 1911. Since that time many improvements have been made in the service rendered and the number of subscribers has more than doubled. Mr. Griffitts later purchased the telephone plant at Brownstown, a town about 11 miles west of Seymour, as well as a number of farmers' lines in Jackson county, so that the Seymour patrons might be able to communicate with all telephone users in the county. The Brownstown plant is now being rebuilt. Mr. Griffitts and his associates also bought the Medora and Vallonia lines and took over the Crothersville system with the rural lines connected with its exchanges, making many improvements on all of the lines. Later they took over the North Vernon and divergent lines, likewise making many improvements in the service.

After purchasing the Jennings county plant Mr. Griffitts closed a deal for the Scottsburg and Scott county systems. This deal was just closed a short time ago and numerous improvements are planned for that territory.

In reply to the Pioneer's question: "Has Seymour always had a good system like the one operated there now?" the Modern Girl tells of the poor service furnished prior to and the factors leading up to the organization of the competing mutual company about 1906. She also tells of the high rates charged by the first company (presumably the Bell company) and of the lower rates offered by the mutual company.

The Modern Girl then asks the Pioneer to tell his story. He proceeds to tell her of his hardships in the northwest, when the Modern Girl awakes only to find that she has been dreaming.

New $250,000 Telephone Company Formed in Nevada.

A new telephone company has been incorporated under the laws of Nevada with a capital stock of $250,000, under the name of the Nevada Telephone & Signal Co. The company has been organized for the purpose of constructing a telephone line between Reno and Tonopah. The line will follow the railroad via Hazen to Reno, a distance of about 250 miles, connecting with all the intervening mining and railroad towns and stations. The new company is affiliated with the Utah, Nevada & Idaho Telephone Co., which has its headquarters at Winnemucca.

The president of the Nevada Telephone & Signal Co. is F. M. Manson, of Reno, manager of the Western Ore Purchasing Co. Adrian Ellis, of the law firm of Dixon & Ellis, of Salt Lake City, Utah, is vice-president; J. T. Goodin, cashier of the First National Bank, at Lovelock, treasurer, and Hugh L. Thomas is superintendent. Mr. Thomas is also superintendent of the U. N. I. T. Co.

It is understood that the plans of the new company include the making of wireless telephonic experiments in various parts of the state. The company is capitalized at $250,000, the par value of the shares being $100 each.

Work on the new line has started at Winnemucca and will be rapidly pushed to completion. Work on the Reno end of the line will commence shortly to connect up with Humboldt county points.

Texas Toll Line Co. Granted a Charter.

A charter was granted by the secretary of state of Texas, on September 19, to the Texas Toll Line Co., with headquarters in Waco, Texas. This company was organized to operate with the Texas Long Distance Co., which has a good system of toll lines extending from Dallas on the north, to San Antonio and Port Arthur on the south. The new company will simply be used for financing additions and extensions to the Texas Long Distance Co.

The authorized capital of the new company is $70,000, all of which has been subscribed. The incorporators are J. B. Earle, E. C. Blomeyer and L. S. Gardner, all of Waco, and the subscribers to the capital stock are the foregoing together with Theodore Gary and Ross Larrabee, of Macon, Mo.; A. F. Adams and H. L. Gary, of Kansas City, Mo.

The directors and officers of the new corporation have not yet been elected.

Change in Capitalization of Texas Telephone Co.

The Texas Telephone Co. has decreased its capital stock from $2,000,000 to $1,800,000, thereby decreasing the preferred stock $200,000. Under the Texas laws the capitalization of a company is paid in at the time of incorporation and the remainder is subscribed for and must be paid within two years, or else the capitalization must be reduced. During the two-year period referred to, all of the stock of the Texas Telephone Co. was sold and fully paid with the exception of $200,000. It was believed by the company's directors that this amount will not be needed for some little time and for that reason the capitalization was decreased.

Telephone Operating Economics—Its Relation to Service

Potential State of the Art—Commission Regulation and Technical Supervision Will Bring Better Service and Allow Companies the Rates Such Service Should Command—Paper Presented at Convention of Indiana Independent Telephone Association—Concluded

By H. M. Friendly

To take only physical value of a property as now existing, into account when determining rates is about as absurd as calling in a butcher to estimate the value of a race horse by calculating the quantity of hide, steak and sausage in him. The fact that a plant is rendering a service passable enough so the manager has not been called upon by the vigilance committee, is no reason the community has been furnished proper, up-to-date service.

Rates to be Commensurate with Service.

One of these days our public service commissioners are going to prescribe telephone service in all its details for each community. Then they are going to name rates commensurate with rendering this sustained service along with a businesslike margin of profit to stockholders.

There is a vast difference between "just a service" and the "best consistent service." What community in this country could not advance its business and social interests by better telephone service than it now has? If there are any absolutely telephone-satisfied communities, it's a safe wager the flag is spiked at half mast on the "meetin' house."

One of the things sure to come is the standardization of equipment as regards efficiency by the commissions—not necessarily as to physical design. Much has been done in that direction by both Independent and Bell engineers, but the rules now prescribing electrical standards are too difficult to determine and recognize for the unlettered.

The engineers of our commissions will devise some plain everyday way of telling us what we can place in a cord circuit or across a loop as a bridge—and what we cannot. Then they will tell us what a telephone should do. They will also tell us a few other simple, concrete facts we ordinary telephone men can understand and appreciate, fortifying us so we can deal with the factory drag-net artist without getting our gills caught when he dips way down in the mud bottom. The public is vitally concerned in this—it is not altogether a private matter.

The plant operator must come to appreciate that there are two kinds of engineers he has to deal with. One is his operating engineers—equipment, traffic, and plant under him—the other is the factory engineers after him.

His operating engineers, perhaps, know even less about running a factory and how to skin quality without making the traveling salesman lie inconsistently than the factory engineer knows about running a telephone property, commercially. One thing is to know how equipment should operate and how it can be maintained in operative condition. Another thing is to know what a subscriber reasonably or unreasonably is apt to expect in the way of equipment and operating service and the many other purely commercial sidelights of the business more indefinite and more difficult to acquire than mechanical proficiency.

For the man in the front office to subordinate his ideas to those of the equipment expert as to what policies shall prevail and what service shall be rendered, is parallel to a tail-wagging dog. The making and selling of service at a profit is a commercial art—the design and maintenance of equipment is a mechanical art.

The plant operator must be the one to dominate the standards of his plant through his operating engineer, regardless of the manufacturers' advice. This has been the practice in all other lines where commercial success has been attained and it is true in the telephone business. Look over your junk heap if you doubt it. It's simply a case of whether you want your plant treated by the doctor or the undertaker.

The equipment expert often overlooks the fact that the subscriber and the using public must be satisfied. If the subscriber wants the telephone company to tell him the time of day, such service should be furnished as within the province of the telephone business—then live in hopes the service thus rendered will some day become a function of the rates to be charged. Don't refuse to render such service just because the equipment expert says it will be necessary to move the clock, if it is to be done, or that the subscriber should carry a timepiece. The subscriber should be made satisfied. But let him pay justly for your service as he pays for other privately-made service.

Wiring of Buildings Not a Rightful Capital Charge.

An item of large expense to operating companies is that of wiring buildings. The charges for such appear as a capital account, whereas, they involve material and labor on private property upon which the company has no franchise rights. Where telephones are continually being disconnected, moved, etc., much capital so involved becomes lost or dead. Economically, it appears all wrong for a telephone company to carry as capital, plant it has no control over or ownership in, for wires once installed belong to the building owner if he elects to forbid anyone to remove them. Besides a considerable item involved is labor cost, which is irrecoverable in any event.

One of these days the commissions are going to issue rulings forbidding any telephone company to do private work and charge it to a company's capital or operating accounts. This will be done in the interests of equitable rates to all, particularly those subscribers and users who do not change or move and those who occasion but small installation expense.

The building owner will see that the wiring is properly installed at his expense, just as he has seen that the electric light wiring, gas, water, and other plumbing has been installed at his expense, for the time of building is the economic time to do such wiring. This wiring done concealed, under inspection as is other wiring, will give less after trouble, thus reducing maintenance.

These commissions are also going to tell us that we must charge for all work and material up to the telephone and must collect for it too. They are going to scrutinize our subscribers' accounts. Then, after that, they are going to tell us we must not incur the expense of connecting a subscriber until we have business-like assurance his account is good, because collection losses are expenses which become a function of rates to be charged those who pay.

Sometime they will tell us that flat rate service must cease. If they do not tell us that, they will tell the electric light and power companies to take out their meters. Next they will do the same with the gas companies, and then they will tell the public they may pay a monthly sum for street car rides. Then the market inspector will use his influence to get meat and produce put on a flat basis—low of course. We will be moving in the direction of consistency then—mark that.

Getting back to our troubles again. If the commissions do not inaugurate a wide-open help-yourself-please policy, per-

haps they will tell us to charge on the pay-for-what-you-get system. But they will tell us something else while holding our ear gently with the thumb and first finger, figuratively speaking—that we must make an equitable switching charge.

They will not permit a five-cent toll charge to those who elect to have measured service and a flat rate charge to others having heavy switching which amounts to one-tenth that sum—mark that, too. What company giving flat rate service, or unlimited service, averages one cent per call? You are apt to get instructions to connect a telephone on the premises of a subscriber for a flat rental sum to cover cost and just profit for instrument line and exchange equipment and incoming business only, taking into account the class of subscribers; then to make a measured charge, if he uses it, based upon your cost of giving him operative service just as electric light and power companies do.

If he has no use for his telephone, he pays little for the facility only. If he has use, he pays justly for the facility you have provided, and the service rendered. But when he uses the telephone service, he is the one who will pay for it, not the other subscribers. Mind, you won't give five or ten cents per switch from the regular subscriber—but you will get more than you now get from the average. Don't get the idea you're going to walk about on the public's neck, under real commission regulation, even if you wanted to, but you will probably have less soreness in your own neck.

Commission Regulation of the Future.

Public commission regulation at no distant day will mean all its name implies. The commissioners will get somewhat inquisitive and pry into a lot of dark closets. But they will put enough light into those closets so you plant operators will also see and know the secrets; and the commissions will, themselves, see a lot in the light you operators now see it. They will then believe what you have been urging upon them these years, as to small profits. The commissions' office should be that of a mutual helper and protector to whom the public and the plant operator, alike, can look to for prompt relief and justice, and the office can be made to mean much more.

Remember, absolute regulation by commission will imply increased authority to these commissions. This increased authority will imply increased responsibility upon them. Then this increased responsibility will, in turn, mean increased obligation upon them. They will make certain that the plants and the finances involved are duly conserved, regardless of what ruling may be imposed in the interest of affording better and more modern facilities to the public.

How about your securities then?

Toll and Local Operating Methods.

Co-operation can be of immeasurable benefit to operating companies. The toll companies can help the local companies by good service, and the local company can help itself and the toll company by helping the toll company through inducing business and handling it expeditiously.

Local companies too often overlook the fact that poor toll service is usually partly their own fault. Operators, busy on local lines, are given the care of toll lines, or exclusively toll operators are given too many lines to handle. Calls become delayed because business is not disposed of promptly. Then the blame is shifted under the claim that not enough lines are provided. This latter fault lies with many toll companies. It is economically wrong to expect an operator to handle and justly time two or more busy lines worth $5 or more an hour at scheduled rates.

Thousands of dollars' worth of lines have been strung where more operators was all that was needed. The longer the lines involving more cost, the greater becomes the waste. Of course, if we have more lines we can justify more operators, but how much more quickly and how many more calls can an operator handle in a day over three to eight lines than she can over two? What will be the relative attention and service to patrons? Delays on toll lines due to operator being busy, not only lowers the capacity of the line but retard calls waiting. Were I asked to express my opinion as to the most glaring economic waste in the telephone operating business, I would unqualifiedly say it was overloading of toll operators.

Local plant operators often censure the toll company for maintaining poor transmission, whereas, the fault may rest largely in the equipment of the local plant. Instruments of very inferior transmission qualities are in the majority. The plant operator buys these because he gets them cheaper, and the manufacturer urges their sale because he makes more profit on them. The business instincts of some of our reputable manufacturers so overbalance their consciences that they now practice this art.

Remember, it is about as hard to tell the capacity of a condenser by looking at it as it is to see through a brick bat, still that old mirror game has been worked on us successfully. Think this over when next you buy. One of the things the telephone plant operator must decide for himself, is equipment efficiency. Later on the public service commissions may take a hand, for equipment is the important element of service and the public—the user—is the one to be first considered.

Long distance service is such an important factor to the public that every specification for local equipment installations should give this phase due consideration. Buying equipment from the lowest bidder without efficiency considerations will set us backwards in place of forwards. When we consider the tons of wire and cables doing toll service and local service, too, rendering 50 to 75 per cent. of the possible transmission efficiency between connected telephones—all due to a parsimonious policy, preventing the purchase of better and more honest equipment at a trivial additional percentage outlay, or with more technical watchfulness—the joke of it all looms quite seriously.

Less than two months ago I was in the main office of one of the largest Independent toll plants in the country. Over two-thirds of the lines—about 60—were prejudiced the equivalent of three miles of standard cable rather than spend about $750 for better repeating coils. Some thousands of dollars had been spent, however, in bringing the toll lines nearer one office serially, affecting a relatively small increase in efficiency—important, however.

The practice of dividing toll revenue on a strictly air-line basis without considering kind of wire is one of the things the commissions are apt to pry into in the public interests. What toll company wants to string heavy copper for possible long-haul traffic, or to enable it to render more satisfactory transmission, if it will receive the same proportionate through rate for light iron? Perhaps copper and iron circuits of the various sizes will have different percentage rate values assigned to them in apportioning through tariffs. What is the ultimate effect on the public's toll service liable to be if a penalty is not imposed upon poor and inferior circuits? Telephone companies cannot always expect to operate under public franchises unless they fulfill the mission of rendering a service that enables the public to enjoy advantages consistent with the potential state of the art.

No influence has more to do with the development of telephone equipment and the general use of the telephone at lower rates than the Independent telephone interests of this country, and their influences are destined to do more. The public has not appreciated fully what this has meant and what more it can mean.

These meetings of the Shield bearers allowing the exchanging of ideas are a wonderful help in standardizing plant operation and public policy but you know, even though we make the old eagle screech here, if we then go home and think about hawks and buzzards, we're liable to dream of losing chickens before morning and perhaps awaken to find our backs all tatooed in yellow besides. (*Conclusion*)

Digest of Telephone Articles in Various Publications

Prepared by Arthur Bessey Smith

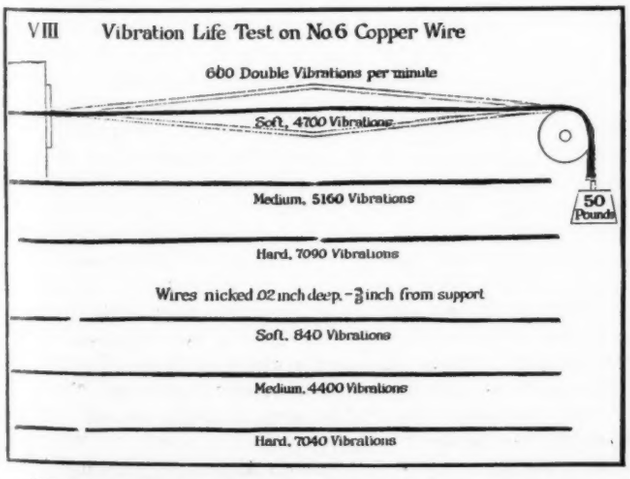
THE MECHANICAL STRENGTH OF COPPER WIRE SPLICES, by E. R. Shepard. Electrical World, Vol. 68, No. 8, August 19, 1916, pages 366-368; eight tables and cuts.

This is an analysis of some tests which are made by the United States Bureau of Standards to determine the relative strength of splices with different grades of copper and the abil-

Breaking Strength of Hard Drawn Bare Copper Wire.

ity of wires to stand injury and vibration. Soft copper wire is much in use because the linemen can handle it without as much care as is required by hard drawn wire, but it can not stand much tension, so it sags and blows together readily. Hard drawn wire can stand greater tension. It is commonly believed that hard wire is soft in the center, the hardness being only "skin deep." Splicing is also considered difficult.

The continuous wire and the splices were tested by pulling them apart in a vertical Olsen testing machine. Unsoldered Western Union splices pulled out at relatively low tension, about half that of the continuous wire. Soldered Western Union splices and sleeve splices always broke outside the splice but near it, at tensions well up toward the breaking strength of the continuous wire. Soldering the center of a Western Union splice anneals the wire and lowers its strength. Careful soldering, which does not anneal the wire beyond the turns, will break at almost full strength. Hard drawn or medium wire will anneal at about 250 degrees Centigrade; solder will flow at about 190 degrees so that the range between the two is



Vibration Effect on Life of Bare Hard Drawn Copper Wire.

thus 50 or 60 degrees. The sleeve splice is nearly as strong as a soldered Western Union splice. Sandpapering the wires made the sleeve splice stronger.

By cutting off the outer shell, the strength of the core of the wire was measured and found to be as great as that of the whole wire, cross sectional areas being taken into account. This disposes of the "hard skin" theory. Microscopical examinations show the grain structure to be identical from center to outside.

Ability to withstand vibrations was tested by stretching a piece of it under a 50-pound tension and by an electric motor giving the center of the span a two-inch motion at 600 cycles per second. Soft wires failed at about 4,700 vibrations, medium wires at 5,160 and hard drawn at 7,090. Similar tests were made by filing a slight nick in the wire (0.02 inch deep, ⅜-inch from the end). Soft wires broke at 840, medium at 4,400, and hard at 7,040 vibrations. Hence the hard wire stands vibration and nicking better than the soft wire.

ELIMINATING TRANSMISSION LINE TELEPHONE TROUBLES, by E. P. Peck. Electrical World, Vol. 68, No. 11, September 9, 1916, pages 515-518; four diagrams, three photographs.

This is an important contribution to the art of telephony in parallel with high-tension power lines. The writer, who is superintendent of the department of tests and repairs of the Georgia Railway & Power Co., gives exact descriptions of the various safety measures which he found necessary to secure good telephone service along the lines which carry 110,000 volts. The telephone wires had to be insulated by two sus-

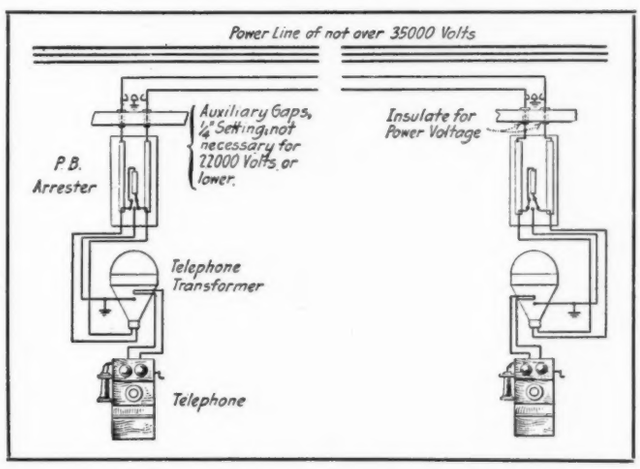

Power Line of not over 35000 Volts
Auxiliary Gaps, ¼" Setting, not necessary for 22000 Volts or lower.
Insulate for Power Voltage
P.B. Arrester
Telephone Transformer
Telephone

Fig. 3. Connections Near Power Lines Up to 35,000 Volts.

pension insulators in series, sufficient for a working voltage of 22,000 volts. This was to prevent puncture by lightning and to prevent leakage which unbalances the line and makes it noisy.

The transpositions must be very carefully made to reduce the voltage between wires to a small figure. The telephone line must also be thoroughly drained, because the power line will induce several thousand volts between the telephone wires and earth. This company uses a 15 kw., 2,200-volt transformer as a drainage coil, connecting the primary, or high voltage side, across the line and grounding the center. These coils are protected by fuses and gap arresters.

The telephone instrument must be very thoroughly protected from lightning. The development which resulted in the type of arrester used was explained in 1915 to the American Institute of Electrical Engineers at Detroit, Mich. If the full transmission line voltage be impressed on the telephone line, no damage must occur to the telephone arrester of the telephone itself. Three sizes of arrester are used, P-A for ordinary telephone lines which are not subject to crosses with lines having voltages higher than 2,500 volts; P-B for those ex-

posed up to 35,000 volts; and P-C for those exposed to voltages higher than 35,000 volts up to 100,000 or 150,000 volts.

The P-A arrester has vacuum gaps and five to seven-ampere fuses. The P-B arrester has adjustable ground gaps to be set low enough to discharge when line disturbances occur but

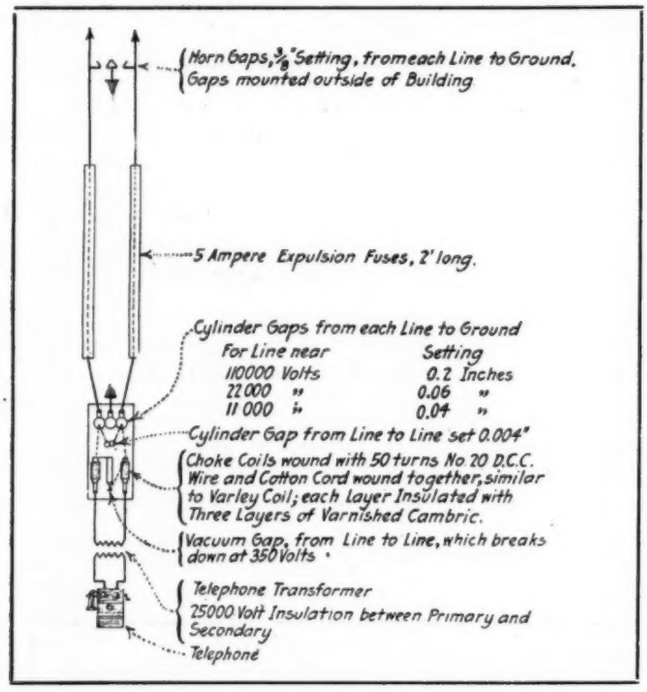

Horn Gaps, 3/8" Setting, from each Line to Ground. Gaps mounted outside of Building
5 Ampere Expulsion Fuses, 2' long.
Cylinder Gaps from each Line to Ground
For Line near Setting
110000 Volts 0.2 Inches
22000 " 0.06 "
11000 " 0.04 "
Cylinder Gap from Line to Line set 0.004"
Choke Coils wound with 50 turns No. 20 D.C.C. Wire and Cotton Cord wound together, similar to Varley Coil; each Layer Insulated with Three Layers of Varnished Cambric.
Vacuum Gap, from Line to Line, which breaks down at 350 Volts
Telephone Transformer
25000 Volt Insulation between Primary and Secondary
Telephone

Fig. 6. Protection for Use Near Very High Voltage Lines.

not during regular operation. A vacuum gap across the line protects the instrument, and is paralleled by an air gap as reserve, for sometimes the vacuum gap is destroyed by continuous discharge. The air gap is set to 0.004 inch. The fuses are 12-inch, five to seven-ampere expulsion fuses. They are mounted on a hinged base which can be lifted and disconnected from the line for attention. The installation is

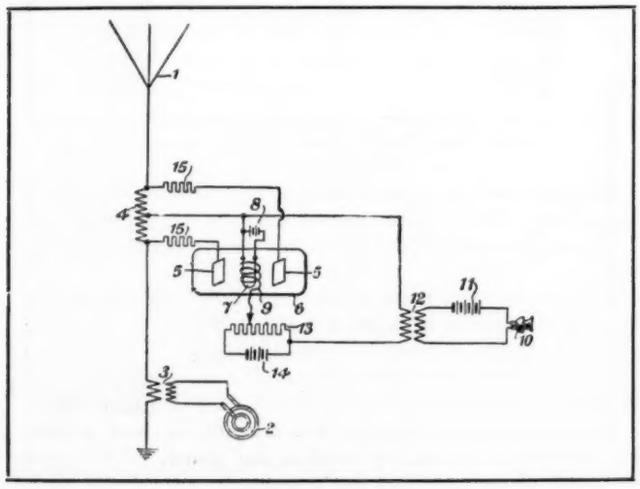


Fig. 32. Application of Pliotron to Wireless Telephony.

shown diagrammatically in Fig. 3. Between the instrument and the line is placed an insulating transformer, which can stand 25,000 volts between windings.

The P-C arrester is like the P-B but has larger fuses and has choke coils between the gaps and the telephone transformer. They are installed as shown in Fig. 6. Horn gaps are used to protect the arrester to prevent damage in case of an actual cross with the power line. The wiring from the building entrance to the top of the arrester must stand 45,000 volts. From the bottom of the arrester to the telephone transformer, the wiring must stand 20,000 volts. The frame of the transformer must be solidly grounded. From here to the telephone, ordinary telephone wire may be used.

Experience has shown that the 0.004-inch setting between the air gap cylinders which protect the telephone, does not cause them to burn together because the five-ampere fuses prevent too great current flow. Some of the first arresters gave trouble from leakage over the surface after long exposure to dust and moisture; also a few vacuum gaps were burned out by a continuous discharge. Both these troubles are slight.

Recent Patents In Radiotelephony. The Electrician (London) August 4, 1916, pages 599-600; two diagrams.

British patent 13,248/1914, Marconi's Wireless Telegraph Co. and H. J. Round, shows the generation of oscillations for wireless telephony by vacuum tubes. The transmitter, *M*, (Fig. 31) varies the alternating current which is amplified by another tube and delivered to the aerial.

British patent 21,388/1914, General Electric Co., of America, shows the application of the pliotron to wireless telephony. The transmitter 10, is in an ordinary local battery circuit (Fig. 32) and delivers a varying potential to the electron discharge tube. The high frequency current is generated by a generator, 2, and passes up the wire through the coil, 4, to the antenna. The varying potential produced by the trans-

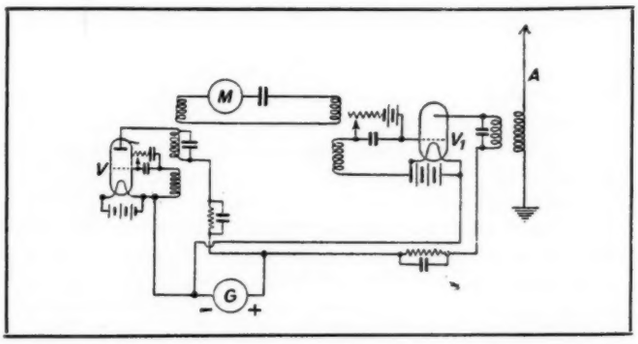


Fig. 31. Circuit for Generation of Oscillations by Vacuum Tubes.

mitter causes the resistance in shunt with the antenna coil, 4, to vary, thus varying the radiated energy.

Inductive Interference as a Practical Problem, by A. H. Griswold and R. W. Mastick. Proceedings, American Institute Electrical Engineers. Vol. 35, No. 9, September, 1916; pages 1339-1375, ten diagrams and two tables; one page of symbols.

In this paper is given a review of the factors which affect inductive interference in telephone circuits from high voltage power transmission circuits, a presentation of the practical considerations regarding the reduction of the interference, and a description of actual cases of the application of these means of reduction. There have been no means developed to care for abnormal conditions, such as breakage or grounding of the power line, nor are such expected.

Distinction is made between the effect of balanced and of residual voltages and currents on the power circuit and between the effect of voltages induced between the wires and those induced between the wires and ground. The balanced components are three voltages or currents equal in magnitude, displaced 120 degrees in time phase with respect to each other, and whose vector sum is zero. The residual components are three voltages or currents equal in magnitude, in common time phase, and whose vector sum is not zero. The balanced voltages and currents are those which perform the useful functions of the power circuit, while the residual voltages and currents do not, and are not essential to the power system.

For the mitigation of the inductive effects of balanced voltages and currents, transpositions offer the most feasible, simple and effective means developed to date. The wave shapes of the voltages and currents in the power circuits are very important. Higher harmonics are present in both voltages and currents and their power of producing disturbance increases with very great rapidity up to about 800 cycles. Practically all the noise is caused by these higher harmonics. There is no doubt that the practice of operating transformers over rated voltage is the cause for the large residual current of triple frequencies observed on star-connected systems.

The precision of the electrical balance of the power circuit is also important because of the relatively large effects of unbalanced voltages and currents. Transpositions of the power circuit in no way change the phase or magnitude of induction produced in telephone circuits by residual voltages and currents, except in so far as it changes those residuals themselves, which happens in some cases. Transposition of the telephone circuit is an effective means for reducing the transverse induced voltage produced by residual voltages and currents.

A discussion is given of the principles to be used in the design of co-ordinated transposition schemes for power and telephone lines. Schemes are described which have been designed for particular cases. Wherever there is an abrupt change in either power or telephone circuit, this point must be made a neutral. The induction must be balanced for that portion of the line between two such points regardless of the rest of the line.

In isolated delta-connected systems, the residuals may be

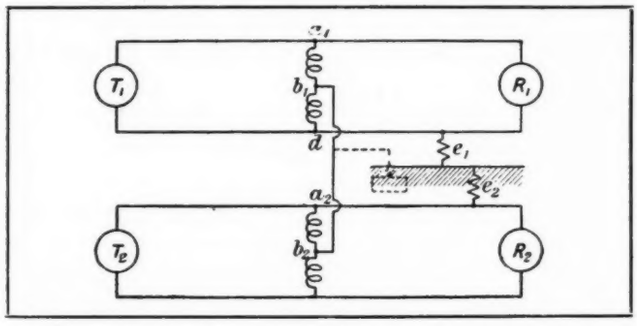


Fig. 1. Circuit Illustrating Cross Talk.

reduced by simple means. In star-connected grounded systems, several measures can be used but none are entirely satisfactory.

A telephone transposition system has been designed which will care for 40 telephone wires (20 physical and 10 phantom circuits) providing adequate cross talk balance between the telephone circuits themselves and being capable of properly co-ordinating with the power circuits to reduce induction. Further work is in progress which will extend this to 80 wires.

A detailed discussion is given of three cases of parallels, showing how inductive interference can be reduced. In the appendix is an outline of information regarding parallels intended to facilitate the study of any particular case.

Earth Connections For Telephone Exchanges, by W. H. Grinsted. The Electrician (London), August 18, 1916, pages 672-674; two diagrams, one drawing.

This article deals with the two uses of earth connections —protection to apparatus and connection of central battery— bringing out a number of points not usually known. It is customary to provide a common ground busbar and to run to it those wires which are to earth the protective apparatus and the frames of machines. If one wire serves to ground two or more pieces of apparatus, it should not be cut but looped onto the connector at the first apparatus touched. This is done so that if a machine be removed, it will not disconnect apparatus beyond. Since a protective ground wire is to be a conductor of lightning, it should be as direct as possible. The water main or hydrant system is the best lightning ground.

The important reasons for grounding the battery are:

1. To reduce the number of fuses required.
2. To prevent cross talk and other disturbances due to leakage and capacity currents between the circuits connected to the central battery.
3. To insure prompt indication of faults and assist in locating them.
4. To insure a reliable busy test on multiple jacks.
5. To assist in identifying wires in outside lines or in distant exchanges.

The cord circuits can be reduced to the elements of Fig. 1. The two connections are joined by the battery, b_1 to b_2. If

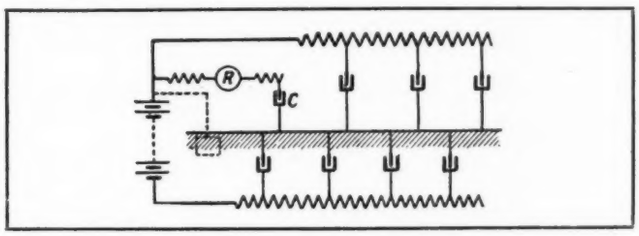


Fig. 2. The False Busy Test.

the battery were not grounded, the difference of potential caused by the transmitter across a_2 and b_2 will drive a current through the unbalanced leakage or capacity e_2 to earth, up through a similar leak e_1 to d, where it divides, part returning by way of b_1 to b_2 and part through the telephones T_1 and R_1 to a_1 and b_1. If the battery be earthed, its connection to ground

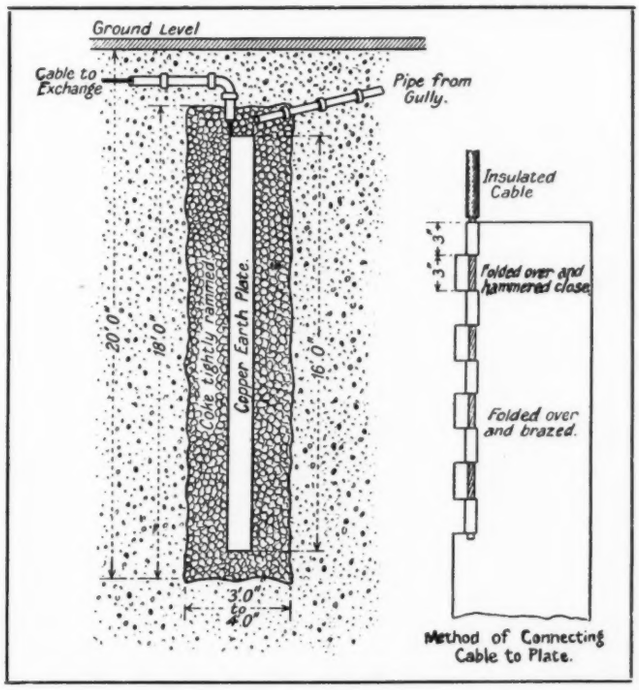


Fig. 3. A Coke-Well Ground.

amounts practically to a short circuit on this leakage path, making the exchange more quiet.

The busy test conditions can be reduced to those shown in Fig. 2. The operator's telephone, R, has a certain capacity and leakage to earth. All the apparatus connected to the two poles of the battery have their relations to earth. If the battery is not grounded, its potential will be constantly varying according to the relative conditions of the apparatus connected

to the two poles. The capacity of the operator's apparatus, *R*, will charge and discharge through her receiver, invalidating the real busy clicks. When the battery is grounded, this uncertainty is removed, for each piece of apparatus has a definite potential with regard to earth.

The value of the usual earth plate is open to doubt. An electromotive force of half a volt can usually be observed between such a ground plate in coke and the iron water pipe before they are connected to the system, the earth plate being positive. It is subject to corrosion because current from the positive pole of the battery leaves it, passing into the earth. We wonder whether anything remains of it after a few years. Since only one of the uses of the earth plate involves the flow of appreciable current, it is proposed to ground the battery only on the lead sheath of cables, with the water mains connected in parallel.

The earth plate should have a resistance of from 0.01 to 1.6 ohms when installed below the water level (permanently moist earth) and from two ohms to 15 ohms when water level can not be reached. Anything above two ohms is not satisfactory. The best form is the coke well, Fig. 3. The plate is No. 16 S. W. G. (No. 14 B. & S.), one foot wide and 16 feet long. Water from the gully keeps it wet.

PAISLEY AUTOMATIC TELEPHONE EXCHANGE, by J. Hedley. The Electrician (London) August 25, 1916, pages 698-702; seven photographs.

This article gives a more or less technical description of what is the first automatic telephone exchange in Scotland. It was cut into service July 15, 1916. Without going too far into the unimportant details, it is characterized as follows:

The equipment is for 1,200 lines, with 915 working. The primary line switches are provided with means for cross-connecting subscribers' line switches to any line, to distribute the traffic. When the called subscriber is busy, a busy tone is given. If the call originated at a manual board, the operator gets a "flash" signal. When the called subscriber replies, the ringing current is cut off instantly. The service meters operate upon completion of calls between automatic subscribers only. The meters are mounted on racks so arranged that they can be read from the manual switch room.

In the case of trunk (toll) and junction (trunked) calls by way of the manual board, talking current is supplied to the telephone directly from the manual board. The connector circuit is arranged to cut off its feeding coils when this is done. The operators at the outlying manual exchanges dial the Paisley subscribers directly over the junction (trunk) circuits. Standard supervision is provided. For night and Sunday work, when no engineering staff is on duty, in the automatic exchanges, the fuse alarm and the indication of failure of ringing current are extended to the manual switchboard. The plant was made by the Automatic Telephone Mfg. Co. according to specifications prepared by the post office engineers.

Growth of Consolidated Telephone Co., Hazleton, Pa.

The commercial department of the Consolidated Telephone Co., of Hazleton, Pa., reports an increase of 867 subscribers during the six months ended May 31, 1916. The total gain during the two and a half years ended on that date exceeds 3,000 stations, a gain of 17 per cent.

Black River Company to Remodel Lorain (Ohio) Plant

Plans Announced for Complete Rehabilitation of the Black River Telephone Co.'s System in Lorain, Ohio—Contract Placed for Full Automatic Equipment—New Home for Main Exchange to be Built and New East Office to be Opened

A complete change in its central office and subscribers' equipment from the present manual system to the automatic type, a new six-position toll board, a modern fireproof building for its main exchange and executive and business offices, and an additional exchange to serve the eastern section of the city, are included in the plans of the Black River Telephone Co. of Lorain, Ohio, recently announced and now in process of execution.

The contract for the automatic telephone equipment and the toll board has been placed with Automatic Electric Co., of Chicago, and it is expected that the new system will be in operation early next spring. The initial order for the central office apparatus provides for 1,800 lines—600 of which will be for individual service—100 lines for private branch exchanges and 1,100 for party lines. The main office will be equipped with 1,200 lines, the south office with 400 and the east office (new) 200 lines.

The central office equipment will be of the latest two-wire, common battery type with automatic ring and busy signal. The party-line telephones will be equipped with harmonic bells, giving full selective ringing, and reverting calls will be handled entirely automatically. The selecting switches will be of the horizontal relay, dust-protected pattern, similar to those installed in St. Paul, Minneapolis and Brainerd, Minn.; Madison, S. D.; Westerly, R. I.; Muskegon, Mich., and Alliance and Washington Court House, Ohio, and ordered for Indianapolis and Harrisburg. Desks for the wire chief and the information and complaint clerks are also to be provided, all such service being handled by the main office.

The new main building will be a 50 by 60 foot, two-story and basement structure, thoroughly modern in all respects, and of fireproof material. The outside will be of brick and sandstone and will be designed exclusively for the needs of the telephone company.

The Black River Telephone Co. was organized 22 years ago, being the second Independent company organized in Ohio. At that time the city had a population of 5,000, and the company served 100 patrons. Since 1894 the city has increased nine-fold in inhabitants, while the telephone company has grown 38-fold, having 3,850 telephones in service.

The Black River company is locally-owned and locally-managed, its officers and directors being among the most prominent business men in Lorain. E. M. Pierce, who has been president since 1897, is also treasurer and director of the Ohio Shovel Works. William Honecker, a leading druggist of the city, is vice-president. The active management of the company is in the hands of C. V. Hageman, who is general manager and treasurer. The secretary, L. A. Fauver, has been with the company since 1902, and is also president of the Ohio Engineering Co.

On the board of directors are: L. C. Alten, a hardware merchant; Hon. W. B. Thompson, judge of the Court of Common Pleas, and formerly attorney for the company; and B. C. Nichols, vice-president of the Lorain Banking Co.

The slogan of Lorain, "Where Coal and Iron Meet," indicates the commercial and industrial importance of the city. Its growth, both in population and in manufacturing activity, has been very great, and has taxed the facilities of the telephone company to the utmost. With the carrying out of the program outlined, however, the company will be in a position to cope with any demands which may be made upon it, not only at present but in the future, and the officials look forward to a very substantial increase in the business it will be called upon to carry.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

481. Why is the power plant of the telephone exchange of the first importance?

482. What is its real function?

483. In what way does the "storage battery" differ from other batteries?

484. Is the theory of the chemical action of the storage battery simple or complicated? Is a simple theory possible as a guide in its operation?

485. What is storage battery electrolyte?

486. What is a very apparent effect of charge and discharge?

487. Why is the average of the specific gravity less in the summer than in the winter for a battery whose physical condition is unchanged?

CHAPTER XXII. Power Plant Principles (Continued.)

488. *Variation of specific gravity and cell voltage as an indication of battery condition.*—In Fig. 167 is given the typical form of the curve showing the variation in the specific gravity of the electrolyte for various conditions of charge and discharge. It should be emphasized, however, that these values are not absolute in any cell for various temperatures, ages, and physical conditions. That is to say, in warm weather, for instance, the specific gravity of the fully-charged cell will not be as high as it is for the same cell in colder weather.

The steady and regular variation through the cycle of charge and discharge, of the specific gravity and cell voltage is a better indication of the condition of the cell than the absolute value, as will be pointed out later.

489. *Other indications of the condition of charge.*—While

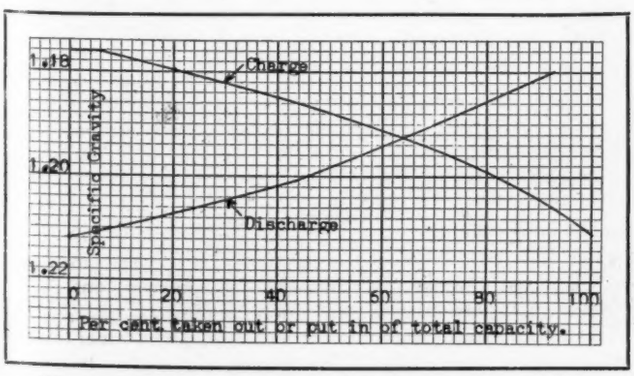


Fig. 167. Typical Curve of Variation in Specific Gravity.

the specific gravity of the electrolyte is by far the most reliable means of judging of the degree of exhaustion, there is another which should be noted in connection with it. It is the difference of potential or voltage between the terminals of the cell. As the charge progresses, or in other words, as the chemical changes in the active material take place, the difference of potential between the terminals of the cell passes through corresponding changes in value.

The voltage across the terminals of the storage cell which is charging or discharging is composed of two elements. The cell may be considered as a part of the conductor through which the current, either charging or discharging, is passing. As a part of the conductor there will be a drop in potential through it, due to the passing current. This drop in potential will be determined not only by the resistance of the cell but also by the strength of the current. This is because its value, for any given time, is determined by the operation of Ohm's law considering the cell merely a part of the conducting circuit.

It is also true that the internal resistance itself of the storage cell is not constant but varies somewhat with the progress of the charge or discharge. The cell constitutes also a *source* of electromotive force due to the chemical activity of the positive and negative plates and the electrolyte between them.

490. *Basis of cell voltage.*—While the user of the cell is concerned only with the voltage between the terminals when the cell is charging or discharging, it is interesting to note that the total cell voltage is produced by several closely related conditions. For instance, the positive plate must be charged, the negative plate likewise, and the electrolyte must have the proper specific gravity in order to secure the full cell voltage. Should a fully charged positive plate be taken from its proper association and be placed in another cell with a *discharged* negative plate, the voltage observed across the terminals of the newly assembled cell would lie between that of a fully charged cell and a fully discharged one.

It is also true that the electrolyte must be of approximately the proper density or specific gravity in order to secure full voltage in the fully charged cell. Should the specific gravity be lower or higher than normal, the voltage of the cell would be reduced.

There is a well defined explanation for this fact which, however, does not seem to be of immediate interest in the matter of obtaining maximum life and service from the standard storage cell. It is introduced here to point out the fact that when the specific gravity of a storage cell which is free from internal short circuits becomes *low*, it is an indication that the cell has not been sufficiently charged for the output required. The remedy is *not* the addition of acid but a lightening of the task or additional charging to replace the overdraft.

It is the measure of this electromotive force of the cell that indicates, in connection with the specific gravity, the degree

of exhaustion or charge. Obviously it is not easy to separately measure these two elements of the voltage of the storage cell. For that reason it is advisable to arrange so that the *normal* charging current or discharging current is flowing when voltage readings for the purpose of gauging the condition of charge of the cell, are to be taken.

Should the charging current, for instance, be higher than normal, the *drop* in potential through the cell considered as a part

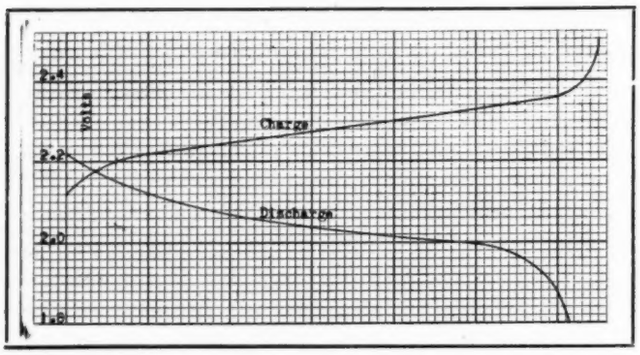


Fig. 168. Voltage Across Terminals of Single Cells.

of the conductor, would, sometimes, have an undue weight in the resultant voltage across the terminals. The same condition would accompany an abnormal discharging current, either above or below the rated strength, and would have the effect of rendering the indications of the cell voltage very unreliable. The cell voltage should always be carefully qualified by comparison with the readings of specific gravity taken at the same time.

491. *Variation in voltage indication.*—Like the specific gravity of the electrolyte, the voltage of the cell is not constant for the same point in the progress of the exhaustion of the cell. The maximum value, for instance, during charge will be found to vary from 2.4 volts to 2.6 volts. The value of the final voltage of the cell upon charge is dependent upon the temperature, the age of the cell, the relative capacity of the positive and negative plates and their condition and the strength of the charging current.

Typical curves of the voltage across the terminals of single cells are given in Fig. 168 for both charge and discharge. It is to be noted that the manufacturers of standard batteries issue instructions to charge the battery until the voltage and specific gravity of the cells show no *further rise for one-half hour* with the *normal* charging current flowing. This rule is evidently designed to cover the condition in the cell due to the variation of the voltage and specific gravity with the temperature, condition of the cell, its age, etc.

492. *The normal rate of charge and discharge.*—At various times reference has been made to the normal rate of charge and discharge. The chemical changes resulting from the action of the charging current take place very gradually. Ordinarily eight or ten hours are required to completely charge any storage cell at its normal rate. Should the current be made stronger than the normal rate, it would be necessary to send a greater number of ampere hours into the cell to accomplish the same amount of chemical change as would be produced by the normal charging rate in eight hours.

The reason for this is that these chemical changes take place slowly. When greater current strength is used in order to hasten them, a portion of the increased current passes through the cell, heating it but not affecting the chemical conversion of the active material. It is true that the stronger charging current has the effect of hastening the chemical changes somewhat but it is always at the expense of heat in the cell, shorter life and waste of the charging current.

The characteristics of all storage cells of the ordinary type in which are used lead supporting plates and active material made from lead, are very similar. That is to say that the various manufacturers have, to a certain extent, standardized their product as to size and capacities.

The different types of stationary storage cells on the market differ from each other, not so much in methods of operation and the chemical composition of their active material as they do in the mechanical methods of manufacture. It is for this reason that the operating methods applicable to one standard type of storage cell are also applicable to others even though produced in different factories.

(To be Continued.)

New Exchange Opening and Operators' Meeting.

A rousing operators' meeting was held by the Central Home Telephone & Telegraph Co., at Maysville, Ky., on September 23. All of the Eastern district exchanges were represented, as well as two or three of the Central district exchanges and the headquarters' office at Louisville. Maysville is well up toward the eastern end of the state, being 60 miles above Cincinnati on the Ohio river, yet the Central Home took the out-of-town operators there, entertained them on Saturday and paid their expenses at the Central Hotel Saturday night, so they could return home on Sunday.

Not only were there nearly 60 operators present, but the day was made the date for the formal opening of the new central energy exchange at Maysville. A general invitation was extended to the people of Maysville to call and inspect the new exchange and examine the workings of

Operators and Managers at Meeting at Maysville, Ky.

what a Maysville paper described as "one of the most complicated affairs ever invented." This same paper's recommendation that "all should avail themselves of this opportunity to see it working," was largely acted on and the hours set for the public reception, 10 to 12 a. m. and 2 to 5 p. m., were not sufficient to take care of the hundreds who assembled to inspect the "complicated affair."

The offices of the exchange were attractively decorated in flowers and early autum foliage. There was somebody on hand at all times to meet the callers, whether townsfolk or visiting operators, and take them through the "works." The amount of interest the home people took in the exchange equipment was equalled only by that shown by the employes of other plants. Punch was served throughout the day and roses were distributed among the women who were guests of the company. It stands to reason that one effect will be to make the advance in rates under the new franchise easier to accomplish.

Visitors arrived in the city during the morning hours and made trips through the exchange. The afternoon was given over to pleasure, the company providing for an automobile trip through the city and the surrounding country and later a boat ride on the Ohio river, a novelty to all but the Maysville people, who do not live inland. Dinner was served at 7 o'clock at the Central Hotel, after which the operators assembled at a hall nearby where the business session was held.

Mayor J. W. Lee, of Maysville, welcomed the visitors in a pleasant speech, to which W. M. Paine, assistant superintendent of the Central Home, responded. S. M. Heller, general manager, was to have made the response, but was not able to be present. Minor Corman, superintendent of the company, spoke on "Some of the Things to Watch When Selecting New Operators." Mr. Paine spoke on the subject of "General Operating," but for the most part the visiting operators monopolized the program.

Among those who presented papers were: Miss Mary Murphy, of Maysville; Miss Lillie Martin, of Carlisle; Mrs. A. Burgin, of Paris; Mrs. Aleen Williams, of Paris; Miss Emma T. Bendel, of Maysville; Miss Rosa Collins, of Carlisle; Miss Anna Dodson, of Maysville; Miss Maude Day, of Paris; Miss Jessie Wilmoth, of Frankfort; Miss Johnis Shryock, of Lawrenceburg; Miss Lillie Smith, of Cynthian; Miss Ella Loomis, of Cynthian; Miss Lucimae Dugan, of Carrollton, and Miss Ona Harrison, of Louisville.

Miss Murphy described "Our New Quarters," going into some detail as to the new board and other equipment and commenting appreciatively on the attractive rest room and general cheeriness of the whole establishment.

It is often worse to attempt an excuse for mistakes in toll records than to admit the error, according to Miss Dodson, who read a paper on "Errors in Posting Toll Tickets." She cited a number of typical errors and noted that they cause "no end of embarrassment, lose the confidence of the subscriber in the operators in general and all employes of the telephone company, and create the impression that the telephone company is always trying to gain what is not due it." Concluding Miss Dodson observed:

"While 'To err is human and to forgive Divine,' this type of divinity is so little present in the public's attitude toward the errors committed in telephone service, that it behooves us to eradicate this human quality, lest all telephone operators die in their sins—so far, at least, as obtaining forgiveness against the public."

The volume of toll business handled by an exchange, according to Miss Collins, of Carlisle, is an index of the rest of the work of the plant. She stated that she has never heard a toll operator complain of having too much work to do, and mentioned the marked increase which the Carlisle exchange has shown for the last two years in its toll business.

Reorganization of Central Telephone Co., of Reitz, Pa.

Following the reorganization of the Central Telephone Co., which operates through all parts of Somerset county, Pa., announcement has been made that the Central Telephone Co. and the Johnstown Telephone Co., of Johnstown, Pa., will work in closer harmony and as soon as extensive improvements can be made to the lines in Somerset, all-night service will be established in the region served by the Central company.

The removal of the headquarters of the Central company from Reitz to Cairnbrook, quarters for the exchange having been provided in the First National Bank Building there, is one of the changes already made.

The Central Telephone Co. was recently reorganized and considerable Johnstown capital interested in the company. J. Fred Nisley, of Johnstown, is president of the company and E. D. Schade, general manager of the Johnstown Telephone Co., is chairman of the executive board.

The removing of the exchange from Reitz to Cairnbrook and the construction of 10,000 feet of cable, extending from Cairnbrook to New and Old Central City, are the principal improvements, while all the equipment is being generally overhauled and placed in the best possible condition.

Ohio State to Erect Two New Exchanges in Toledo, Ohio.

The Ohio State Telephone Co. is erecting two new exchanges in Toledo, Ohio. The Walbridge exchange will be erected at 889 Orchard street, and the Dorr exchange will be built at 1335 Palmwood avenue. The buildings will be two stories high and 28 feet wide by 52 feet in depth. Including the equipment to be installed, the two new exchanges will cost approximately $130,000.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies, Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Philadelphia Electric Co. Cannot Use Keystone Conduit.

The Pennsylvania Public Service Commission has denied the application of the Philadelphia Electric Co. for permission to lease the unused conduit system of the Keystone Telephone Co., of Philadelphia, Pa., for a period of 21 years dating from January 1, 1915, with the privilege of further extension of 15 years, at an annual rental of four cents per foot of conduit space actually occupied, with a minimum payment of $25,000 the first year and an increase of $12,500 per year thereafter up to 1921, at which time the rental for the balance of the term of the lease would be at the rate of not less than $100,000 per annum.

In refusing the desired permission, the commission states that the rental exacted would prove a hardship on the public, the patrons of the electric company, and that the serious error made in arranging the contract was the omission of a maximum annual rental upon a reasonable basis of computation. The commission also upholds the protest entered by the city upon two points: (1) The amount of annual rental per foot specified, and (2) the failure of the lease to stipulate within what period of years the overhead wires of the electric company would be placed underground. In its decision, the commission says:

"No one can say how many of the 10,000,000 feet of con-

duit available will be occupied by the electric company, but it is not entirely inconceivable that the whole number may be used, in which event the electric company will be required to pay $400,000 out of its gross revenues, or more than 13 per cent. on a reasonable valuation of the underground system. Another material oversight in the proposed contract is the failure to provide for an allowance or reduction of the minimum annual rental of and to the extent the telephone company itself will use the ducts.

The contract is too highly speculative to meet the commendation of the commission; there may never be a single foot of the conduits used but, nevertheless, there must be paid annually $100,000; there may be a great amount used, possibly enough to absorb $400,000 per year, perhaps twice as much as a fair return upon the investment. In either event the public, the patrons of the electric company, will be mulcted for a long period of years. Any waste on the part of the utility enterprise necessarily reacts upon the consumer either in high rates or poor service."

High Tension Interference in Iowa.

In TELEPHONY of September 16, page 30, was published an item referring to a ruling of the Iowa Railroad Commission relative to the rights of telephone companies as relating to the construction of power transmission lines. The information upon which this item was based has been found to be incorrect. The railroad commission of that state is now inserting in all franchises granted to power transmission companies this clause:

"This franchise is granted upon the express condition that if, after the line is constructed, substantial interference with a telephone line, built prior to the construcion of the transmission line, shall develop, then this commission may make such order in relation thereto with all the force and effect as though such order had been made prior to the building of the transmission line, and as a part of the terms upon which this franchise was issued."

The purpose of this clause is to preserve the rights of all parties in statu quo, as they existed before the franchise was issued, pending the conclusions of the commission, in its general investigation of the causes and remedies for interference by electric transmission lines with telephone lines.

Referendum Must be Held on Buffalo Merger.

Corporation Counsel Rann, of Buffalo, N. Y., has filed an opinion relative to the proposed referendum on the merger of the Federal Telephone & Telegraph Co.'s system, in Buffalo, with the New York Telephone Co. In his opinion, he states that if the council adopts a resolution consenting to the proposed merger, its action could still be referred to the people. The question as to whether the city of Buffalo should ask the legislature to pass an enabling act to permit Buffalo to own and operate a municipal telephone plant, the corporation counsel states, must be omitted in the proposed referendum, however, because it is not legal.

Telephone Company Liable for Defect in Street.

A telephone company set a pole in the street by the permission of the city, under an ordinance requiring that it restore the street and save the city harmless from all loss or damage, giving bond to that end. Thereafter a pedestrian was injured by falling into a depression about the pole. As between the telephone company and the city, the court held, the former was primarily liable, so that the telephone company, having paid the injured person's judgment against it and the city, could not have contribution from the latter. Kinloch Telephone Co. vs. City of St. Louis; Supreme Court of Missouri; 188 Southwestern 182.

Compelling Connection Between Companies.

A bank installed in its building a private intercommunicating telephone system, with its own instruments, with which the *H.* telephone company connected. The court held that the bank could not, in suit against the *P.* telephone company, have injunctive relief to compel the latter to connect its system to the bank's thus effecting a connection of the two telephone systems, competitors, the *H.* company not being a party to the suit, until the public service commission fully considered all questions involved—injunction being an extraordinary remedy, which will not be granted unless the Oregon Public Utilities act (laws of 1911, page 483) will work harmoniously as a result. First National Bank of Albany vs. Pacific Telephone & Telegraph Co.; Supreme Court of Oregon; 159 Pacific, 561.

Liability for Injury Due to Sagging Wires.

Where the wires of a telephone company are so constructed and maintained that they are apt to sag and come in contact with the wires of a traction company, charged with a high current of electricity, whereby the same may be transmitted to its line, the telephone company owes to its subscribers the highest degree of care to prevent injury to the property or the life of its subscribers, and if it fails so to do and injury results proximately therefrom, the company is liable.—Pioneer Telephone & Telegraph Co. vs. Tulsa Vitrified Brick & Tile Co.; Supreme Court of Oklahoma; 159 Pacific, 477.

Right to Use City Street.

Where the right to lay electrical conductors under the city streets was abandoned by a non-user for over 20 years, the city's revocation of such permission did not impair a contract obligation. Where the plaintiff corporation derived its right to lay electrical conductors under the city streets from the city's permission pursuant to a legislative act, the court held that the defense that such right had been abandoned was available to the city, its officers, and a company through whose subway plaintiff desired to lay its conductors.—New York Electric Lines Co. vs. Gaynor; Court of Appeals of New York; 113 Northeastern, 519.

Restriction on Public Use of Private Telephone.

Where the defendant installed private and pay station telephones in the plaintiff's place of business under an agreement to share with him the pay telephone receipts, a rule, restricting the private telephone's use to plaintiff, is reasonable, at least against its promiscuous use by others.—Johnson vs. Mountain States Telephone & Telegraph Co.; Supreme Court of Utah; 159 Pacific, 526.

Bell Companies to Carry Insurance Under Kentucky Law.

The Kentucky Workmen's Compensation Board has authorized the Cumberland Telephone & Telegraph Co. and the Southern Bell Telephone Co. to carry their own compensation insurance under the new Kentucky compensation law.

Commission Changes Fiscal Year to December 31.

The Pennsylvania Public Service Commission has adopted a resolution fixing the fiscal year for reporting purposes to end December 31. Companies that have been reporting to the commission will file the usual annual report for the fiscal year ending June 30, 1916.

Niagara Falls Board of Trade Approves Merger.

The board of trade of Niagara Falls, N. Y., has approved the proposed merger of the Federal Telephone & Telegraph Co. with the New York Telephone Co., in that city.

Summary of State Commission Hearings and Rulings.

CALIFORNIA.

September 23: Hearing on application of the California Light & Telephone Co., of Santa Rosa, Cal., for an adjustment of its rates.

October 16: Hearing on the application of the Southern California Telephone Co. for permission to take over and merge into one the properties of the Pacific Telephone & Telegraph Co. and the Home Telephone & Telegraph Co., of Los Angeles.

COLORADO.

October 10: Hearing on the investigation into the reasonableness of the rates and adequacy of the service of the Mountain States Telephone & Telegraph Co. in the state of Colorado.

ILLINOIS.

September 29: Hearing on the application of the Kilbourne Telephone Co. for a certificate of convenience and necessity to operate a telephone system in the village of Kilbourne and vicinity. Case 5,456.

October 10: Continued hearing on the petition of the city of Peoria, by Richard H. Radley, corporation counsel, to compel the Central Union Telephone Co. to reduce its telephone rates to subscribers in the city of Peoria. A cross petition has been filed by the receivers of the Central Union Telephone Co. Before this hearing is held the engineers and auditors of the commission will have made their report on the valuation of the company's property, its income and other questions relating to the question of rates in Peoria. An expert witness introduced by the company at the hearing before Commissioner Yates in Chicago on September 14 and 15 placed the value of the company $187,000 less than the figure of the company and allowed no amount for growing value, an item of about $200,000 in the estimate submitted before the commission by the company. Faced with evidence submitted by the city, the company also reduced an item for paving from $52,000 to $27,000. The city contends that reductions should be made in the amount allowed for depreciation and an item of $13,000 paid the holding company by the local company eliminated.

INDIANA.

September 16: Hearing on the application of the Consolidated Telephone Co., of Danville, Ind., for permission to sell its entire system in Hendricks county to the Indianapolis Telephone Co. The purchase price is said to be approximately $80,000.

MINNESOTA.

September 14: The commission denied the petition of the Richmond Telephone Co., of Richmond, Minn., asking that the commission make an inventory of its plant and an investigation of its books and methods of operating and advise what rates should be put into effect and what class of service should be furnished its subscribers. The petitioner recites that its subscribers want night service, but that the present rates are not adequate to provide a reasonable return with the present limited service. In denying this application, the commission states that the burden of proof is upon the telephone company to show that it is entitled to an increase in rates. This ruling, however, does not foreclose the company from filing application to increase its rates.

September 28: Hearing at St. Paul in the matter of the petition of James Keenan, asking the Northwestern Telephone Exchange Co. to increase its local rates in Austin, Minn., and to cease certain discriminatory practices.

September 29: Hearing in the village hall at Cold Spring on the application of the Northwestern Telephone Exchange Co. for permission to increase its local exchange rates at Cold Spring as follows: Single line business rate, from $2.25 to $2.50; single line residence rate, from $1.25 to $1.50.

October 4: Hearing at the Syndicate Hall, Preston, Minn., on the application of the Standard Telephone Co. for permission to increase certain of its rates at Preston which, it alleges, are too low to afford a reasonable return on the investment.

October 5: Hearing at the city hall at Caledonia, Minn., in the matter of the application of the Standard Telephone Co. for permission to increase certain of its rates at Caledonia.

MISSOURI.

September 25: Hearing on application of the Home Telephone Co., of Joplin, Mo., for permission to purchase the plant of the Nevada (Mo.) Telephone Co. and the plant of the Missouri & Kansas Telephone Co., at Nevada, Mo., and to consolidate the two exchanges, and to put into effect a new rate of $3 per month for business telephones and $1.50 per month for residence telephones. Case 1,068.

NEBRASKA.

September 27: Hearing to determine whether or not the Kearney Water & Electric Power Co. would be liable for damages incurred to the lines of the Farmers Telephone Co., of Gibbon, by the construction of a high voltage transmission line along the route of the telephone company's lines. The application of the power company for permission to construct a transmission line is now before the state railway commission, and the Farmers company has filed a protest, alleging that its lines will be rendered useless by the close proximity of the transmission line.

NEW JERSEY.

September 19: Hearing on application for the approval of the consolidation of the New York Telephone Co., the Delaware & Atlantic Telephone Co. and the Atlantic Coast Telephone Co. The purpose of the proposed consolidation is to combine all the units of the Bell company in New Jersey into one operating company.

OHIO.

September 18: Petition filed by the Ohio State Telephone Co. and the Central District Telephone Co., asking for authority to interchange service and to sell property to each other in Columbiana county. It is proposed that the former sell its plants and exchanges in East Liverpool and Wellsville to the latter for $104,258, and the latter sell its plant and exchange property at Salem, Lisbon, Columbiana, Leetona, East Palestine and Salinville to the former for $139,719. The toll lines, central office equipment and subscribers' stations are not to be included in the deal.

September 20: The commission granted the application of the Jackson County Home Telephone Co., of Jackson, Ohio, for permission to issue its common capital stock of the par value of $8,600, to reimburse present holders for moneys expended from treasury for improvements, etc., which they might otherwise have received as dividends, and to reimburse the present treasury. Order 910.

September 23: The St. Marys (Ohio) Telephone Co. was authorized to issue its 6 per cent. preferred capital stock of the par value of $10,000, the proceeds to be used to discharge an indebtedness of $5,200 incurred in the construction of additions and extensions to its plant and to provide funds for further additions. Order 938.

SOUTH DAKOTA.

September 1: In the case of the Dakota Central Telephone Co., of Aberdeen, vs. the Farm & Home Telephone Co., of Wagner, the commission ordered that the compensation of two cents per message named in the contract dated September 1, 1915, between the complainant and defendant be confined to completed calls only and that the Farm & Home company is required to furnish the Dakota Central company, complete relay tickets for each message transmitted under the terms of the contract. Order F-307.

WISCONSIN.

September: The commission allowed proposed extensions of the Wisconsin Telephone Co. in the town of Caledonia, Racine county, and in the town of Peshtigo, Marinette county.

September: The Wheeler Telephone Co. applied for the right to extend lines in the town of Hay River, Dunn county. The Boyceville Telephone Co. is affected.

September: The notice of the Wisconsin Telephone Co. for leave to extend lines in the town of Merton, Waukesha county, was withdrawn.

September: Complaint filed with the commission, and a hearing ordered, in re the alleged inadequacy of the service rendered by the Pine Bluff Telephone Co., Dane county.

September: P. A. Gullickson and other complainants, of Rosholt, have filed a petition relative to inadequate and inefficient service of the Nelsonville Telephone Co., and the Wisconsin Telephone Co.

September: The commission upon its motion will investigate the alleged refusal of the North Lincoln Telephone Co. to extend service to A. B. Minton and others.

September: Complaint filed by Fred S. Clark, of Edgerton, relative to failure to secure telephone service from the Edgerton Telephone Co.

September 26: Hearing at Westfield, Wis., in regard to the adjustment of rates for interchange of service between the Westfield Farmers Telephone Co., the Coloma Telephone Co. and the Marquette & Adams County Telephone Co. U—967.

Your Holiday Turkey

It Will Cost You More, So Will the Cranberries

By J. C. Kelsey

Have you an aeroplane? If not, have you a hook and ladder? If you have not, possibly the old family ladder will do—it may be high enough. But it is very doubtful that you will have anything high enough to help you see the price you will pay for your annual turkey and the usual bag of cranberries.

Nobody has escaped the scourge, nor will any one be able to escape the inevitable higher costs. The transient who flits from one hotel to another, who spends his nights under strange roofs, has no more escaped the need of a high ladder than the householder.

Everything we know of has advanced from 20 to 50 per cent. and before the long, cold winter of 1916-17 is over, still another fresh application of 40 per cent. will be added to what we pay now. Canned goods, including fruits, salmon, stringed beans, and corn will jump at least 40 per cent. and the lover of sauerkraut will realize that even this humble, though succulent, food has been agitated by the great world's war.

Cotton goods have jumped 25 to 35 per cent. and a woolen rag is worth its weight in much fine gold. Once your wife reluctantly told you she had paid $5 for a pair of shoes, and she felt that her prudent and economical ancestors were literally turning over in their graves. Today, she has to pay all the way up to $10 for the same comfortable shoe, knowing full well that her ancestors have ceased to struggle.

Worse and more of it! The smoker who once gathered up six cigars from the glass case in exchange for his quarter, now finds his favorite brand of hemp running straight five for a quarter.

Even the paper bag which your grocery store so extravagantly used, has gone up from 85 cents to $1.55 per bundle. China and glassware have joined in the speeding process, and bar goods have gone even higher. Clubs have raised their dues and churches have forever departed from the idea that salvation is free.

Men are talking $2 wheat—some go so far as to predict this great staple at $5 a bushel before spring. The baker has raised from five to six cents a loaf and hopes that the cost of plaster of Paris will not raise and cheat him of his hopes for increment.

It is a merry chase, and the hindmost man usually stands not on the order of his raising and gets away with it.

But I am wrong! Every walk of life has advanced but one. I forgot the telephone man who works 24 hours a day for the sole reason that no more time can be crowded into one human finite day.

The telephone man still sells service at $1.50 and $1 or possibly $2 and $1. He lives on canned goods and once a year has turkey and cranberries, anyway. Even his six-for-a-quarter cigar will go from him and leave him desolate.

The telephone man's wife has to wear shoes, and cotton and wool products come closely into her life. The family also has to eat, wear clothing and shoes, and occasionally needs medicine.

Do you remember 1906? It was a banner year. Even then the high cost of living was a national issue. We thought we had reached a maximum in all human effort and our achievements were to stand forever as a record for future generations.

Just to show how radically wrong our belief was, a table of comparison of 1906 and 1916 prices is given. This table applies mostly to the much-abused farmer, one of the principal obstacles in the way of fair telephone prices.

	1906.	1916.
Wheat, per bushel	$ 0.70	$ 1.55¼
Oats, per bushel	.38½	.50
Corn, per bushel (1912)	.52	.72½
Bran, per ton	19.00	26.00
Flour, per barrel	4.40	8.70
Hay, per ton	11.50	21.00
Cattle, per cwt. (1912)	7.00	9.00
Sheep, per cwt. (1912)	4.25	7.50
Lamb, per cwt. (1912)	6.50	11.00
Calves, per cwt. (1912)	10.00	12.00
Hogs, per cwt.	10.00	12.40
Bacon, per pound	.17	.25
Lard, per pound	.12	.16½
Cheese, per pound	.12½	.21¼
Butter, per pound	.24	.36¾
Eggs, per dozen	.21½	.45
Beans, per bushel (1912)	2.75	7.00
Honey, per pound	.13½	.15

The men who have benefited most by this tremendous increase in prices are the very ones who have actually prostituted the telephone business in some localities. The men who get $1.55 for one bushel of wheat grow angry in protest over a charge of $1.25 for a telephone for one month.

It is the men who get the great prices of the world who are trying to inflict the low prices of the world on their neighbors. It is this group of men who talk loudest about government ownership of telephones, even though one government has already proved that it costs $3 a month to give farm service.

But the farm problem is not all. No man has the right to censure any man or group of men for protecting their own rights and desires as they see fit—and it is not the intention of this column to say a single word against the mutual telephone system. Looking things square in the face, it is but a counterpart of the original Independent telephone movement.

Villages could not get satisfactory telephone service because the Bell interests were naturally engaged in meeting the needs of the great market centers. Farmers could not get telephone service because the early Independent telephone man had all he could do to supply local service and build some toll lines.

It still remains for the law of economic fitness to tell us which is the proper method of giving service. But the fact remains, regardless of local conditions, that the telephone man has not left the 1906 class, or possibly he has never reached it.

Once upon a time, there was a man who, when slapped on one cheek, patiently turned the other until the man who started the slapping grew ill from sheer weariness. If a man came along and stole his coat, he pursued him down the long highway and insisted that he take his overcoat.

This man was a first cousin to the man who, seeing the frozen viper in his pathway, took compassion upon it and warmed it back to life, only to be stung to death by the reviving snake which nature had only taught to strike.

Both these men are or must be ancestors of the telephone man who goes blithely yet blindly on his way, charging Civil-war prices for European-war service.

Does any farmer believe that he is getting too much for

his products? Does any concern which has raised its prices, feel satisfied that it has done no more than to get them at last where they belong? Does any sane man believe that the mere stoppage of artillery fire in Europe will cause each and every industry to lower its prices?

Nothing short of a great debacle will jar the prices of today down—it is a certainty that no voluntary agency will be the reason. Not a cent of decline will there be on any product until there comes that inevitable tide of supply, engulfing and overpowering the giant of demand.

Then, as the Philistines fled from the falling temple which Sampson toppled, all prices will go together. And as the rushing procession goes by on its downward path, every merchant will point his finger at the stationary telephone company and demand that he go down with them.

Not a thought of gratitude that the telephone man stood still and did not raise his price. Not a moment of analysis will they give to the telephone man's plight, except possibly that he was a fool for not listening to opportunity. "Down with him! We must go down and he must go too," they will say.

The world never stands still. The human race has ever been in a procession of progress. Men have stood still, only to be trampled to death by the marchers, whose eyes are raised to the stars of opportunity. A mere human being under their feet had no more consideration than a stone.

Men have even tried to stop the procession of progress only to be hopelessly ruined or absorbed in the tide. Consequently, there is little difference whether one stands still or tries to elbow backward through the crowd. Both activities start with their death sentence pronounced.

Telephone men must follow the tide of increasing prices because the procession of progress has no patience or tolerance of anything in its way. It matters not what the difficulty may be ahead, it cannot for one moment compare to the hardships of elbowing the way back toward the end of the procession.

This procession has no end. Once a man or industry loses its way or position in the line of progress, the terrors and hardships are legion compared to the difficulties in the path of progress.

Telephone men argue that the state commissions will not allow a raise. What will a commission amount to when all the evidence in the world is in your favor?

A commission is, after all, but a group of men, who come and go and are soon forgotten. What can a group of men do to stop a great tide of demand for the normal rights of an industry—it waits for no man.

The public, even though it may appear against you, will soon be ashamed by the very weakness of its evidence.

The trouble with commissions, if there is any real trouble, is that we have not given them enough to do. They only have occasional cases in different parts of the state, and they get the notion that they are dealing with rare exceptions.

What a commission should have is every company in the state on its hands clamoring for a proper income, at a time when every bit of evidence is in its favor.

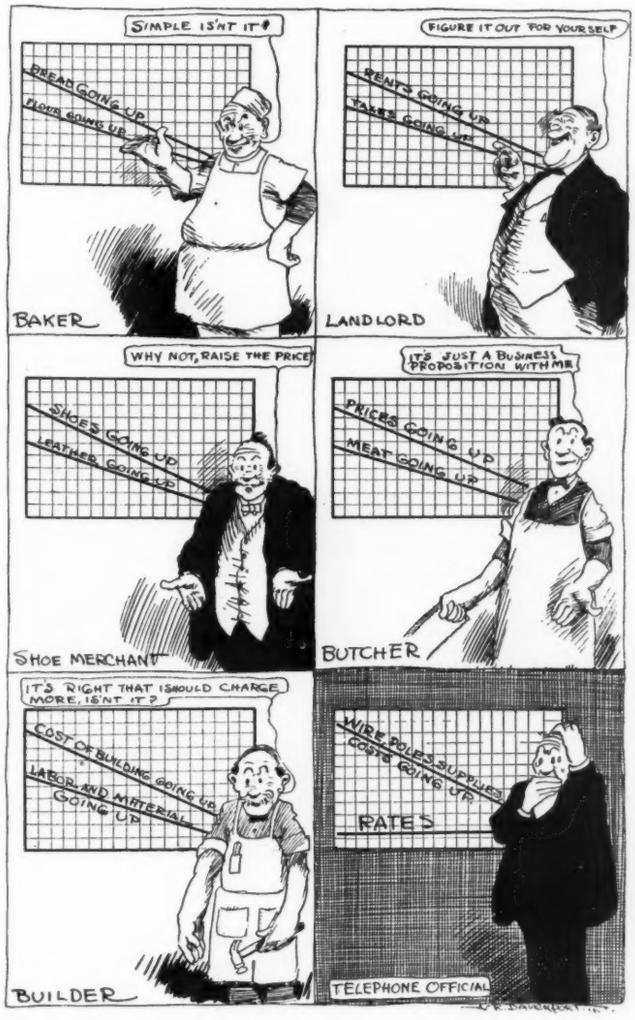
Coming one at a time, no wonder a telephone company gets an occasional dose of injustice. It requires numbers to get proper safety in war, and in peace as well.

Once in a while a commission hands down a peculiar decision. Such decisions are due to fantastic theories of some of the understudies.

A recent Indiana case at Connersville certainly reveals the necessity of a concerted effort on the part of telephone companies to get justice. The Indiana commission apparently undertakes to command a quality of service and simultaneously limits the amount the company can spent upon it.

A company, operated economically at an expense of $15,000 per year, cannot be ordered to operate at $12,000. If a commission has such power, it is time for some company to make a test case of it.

However, getting back to the turkey and cranberries, they will cost you still more this fall. Your boots, your wife's shoes, and your children's shoes, will exceed the telephone



From Pacific Telephone Magazine.

Think It Over.

bill of all the shoedealers put together. Your grocery and meat bills will be larger than all the telephone bills of those dealers.

You are growing a little bit older. At an advanced age, it is hard to stand still and dodge the passers-by in the march of progress. You should be thinking of a rainy day, not only in your personal life but in your business life.

I sincerely trust that when you buy the turkey and cranberries from your merchant, you will have the courage to look him in the eye and tell him he will have to pay the same advance for his telephone service, which he needs more than you do the turkey and cranberries. Will you do it?

MORAL: Tit for tat.

Independent Company to Buy Out Bell in Greenville, Tex.

The people of Greenville, Texas, have voted in favor of a consolidation of the two telephone systems in that city, the Home Telephone Co. to take over the plant of the Southwestern Telegraph & Telephone Co.

Telephoning In An Aeroplane.

The accompanying illustration shows the modern equipment utilized for telephoning in aeroplanes as recently developed at Chicago. The rush of the wind and the deafening roar of the propeller discourage conversation between the pilot and the passenger in an aeroplane but this special telephone equipment makes such conversation possible.

The apparatus, called an "Aero-phone," consists of two double-head telephone receivers and two special types of

Aero-Phone for Conversation Between Pilot and Passenger.

chest transmitters. The receivers are held against the ears by the spring head band so that practically all of the disturbing noises are excluded. The spring tension, however, is such that the entire outfit is not uncomfortable.

Special transmitters provided with soft rubber caps, are strapped to the chest at a point below the collar-bone and above the third rib. In speaking, the chest muscles transmit the voice vibrations to the transmitter, thus enabling a telephone conversation to be carried on between the two occupants of the aeroplane.

The receivers and transmitters are connected by suitable cords which terminate in a small plug. As the aviator or passenger takes his seat, the plug is inserted in a jack mounted in the framework of the machine. One of these jacks is provided for each occupant. The battery required consists of three standard telephone dry cells which will provide continuous service for 100 hours without any appreciable loss of transmission quality.

It is pointed out that the simplicity and efficiency of this apparatus is sure to find favor among aviators, especially those engaged in the military branch of aerial work, modern aerial warfare having made it necessary that aviator and passenger be in communication at all times.

Construction Work at Marion and Bluffton, Ind.

Extensive cable construction work is about to begin on an aerial and underground cable estimate at the Marion, Ind., exchange of the United Telephone Co.

Additional underground conduit is also being laid in the United company's exchange at Huntington, Ind. About 100,000 feet of cable ranging from 25-pair to 900-pair will be installed at both exchanges.

The company's commercial office at Huntington was recently moved into a new building and a complete new central office equipment consisting of five 3-position sections of common battery switchboard with associated racks, frames, desks and power plant is now being installed in the Huntington office. The telephone toll lines will enter the new office through a large gage composited underground cable.

Cable construction work at both exchanges will be directly under the supervision of F. F. Davis, general inspector, with headquarters in the general office of the company at Bluffton, Ind.

First Meeting of Reorganized Indianapolis Telephone Co.

The Indianapolis Telephone Co. held its first stockholders' meeting at Indianapolis last week, there being represented a total of 22,957 shares of stock out of 29,350 outstanding. As the reorganized company began business May 4, 1916, and as the fiscal year fixed by the public service law ends June 30, 1916, reports could not be submitted, it was explained by the president, covering a year. However, the combined balance sheet of the company of August 31, 1916, was read, as follows:

Investment Assets.		
Plant and equipment		$4,017,992
Construction work in progress		275,659
Securities owned		272,000
Current Assets.		
Cash and convertible securities	$ 185,641	
Accounts and bills receivable	50,558	
Material and supplies	35,780—	271,979
Deferred items		15,229
Total assets		$4,852,859
Capital Liabilities.		
Capital stock: common	$1,035,000	
Preferred	1,900,000	
Bonds outstanding	1,527,000	
Mortgage obligation	28,711	
Total capital liabilities		$4,490,711
Current liabilities in process of payment		69,290
Deferred items not due		62,346
Reserve for accrued depreciation	36,943	
Reserve for contingencies	7,611	
Other surplus reserved	10,150—	54,704
Surplus		175,808
		$4,852,859

The directors re-elected by unanimous vote were: William Fortune, Louis Hollweg, F. D. Stalnaker, J. H. Holliday, A. A. Wilkinson, J. K. Lilly, J. N. Carey, H. S. New, W. L. Elder, L. C. Huesmann and Geo. G. Snowden, of Indianapolis; W. L. Moellering, of Ft. Wayne; S. G. McMeen and F. R. Huntington, of Columbus, Ohio, and F. W. Stevens, of Ann Arbor, Mich.

Following the meeting of the stockholders the directors met and elected officers as follows: President, William Fortune; vice-presidents, Louis Hollweg, and S. G. McMeen; treasurer, F. D. Stalnaker; secretary, C. S. Norton. The executive committte was appointed as follows: William Fortune, chairman; Louis Hollweg, S. G. McMeen, F. D. Stalnaker and A. A. Wilkinson. The president reappointed E. L. Cline, general manager, LeRoy Parker, controller and E. V. Hanes, general auditor.

The new automatic system is expected to be in operation in Indianapolis within six months, according to a statement made by President Fortune, as the work is progressing satisfactorily.

Personal Items from the Field

L. S. GARDNER, auditor and secretary of the Texas Telephone Co., Waco, Texas, is a Missourian, and has been in the telephone business since 1911. In his earlier days, after graduation from a business college, Mr. Gardner entered the insurance and real estate business. He was later a railroad rate clerk, and afterwards became a banker, serving in various positions from bookkeeper to cashier in banks in southern Missouri.

L. S. Gardner.

In 1911, while cashier of a bank in Charleston, Mo., Mr. Gardner accepted the position of assistant auditor for the Southeast Missouri Telephone Co., which operated some 23 exchanges in southeast Missouri at that time. He was later made auditor of the company.

When the Brazos Valley Telegraph & Telephone Co., of Waco, Texas, was re-organized, in 1913, Mr. Gardner was asked to go to Texas as assistant auditor of that company, which he did. Later that same year he was promoted to the position of auditor for the property, and when the company was absorbed by the Texas Telephone Co., he succeeded to a like position with the new organization.

Mr. Gardner is an expert accountant, thoroughly conversant with modern accounting practices. He is of the "new school" of accountants, with up-to-date ideas of accounting and office efficiency.

The large force of assistants and clerks under his supervision in the office at Waco hold him in high regard, for he has a reputation for dealing fairly with those in his employ. Under his charge the accounting system of the Texas Telephone Co. runs smoothly and efficiently.

Mr. Gardner is also active in Independent association affairs, and heads several important committees of the Texas Independent Telephone Association.

H. M. Cox, of Waco, Texas, district commercial manager of the Southwestern Telegraph & Telephone Co., with headquarters in Waco, during the past six years, has become connected with the Texas Telephone Co. of that city as local manager, succeeding Ben C. Moulden, who has been transferred to the staff of the general superintendent.

Mr. Cox is a telephone man of considerable experience in several departments of the business. He has been with the Southwestern company a number of years, having served as local manager at Denison, Texas, Ennis, and other places. Following the taking over by the Texas company of the Southwestern local exchange in Waco, Mr. Cox was to be transferred by his company to Wichita Falls, Texas, but because of his reluctance to leave Waco, the local company was enabled to obtain his services.

SAMUEL TOMLINSON, of Plymouth, Ind., and F. R. Strickler, of Franklin, Ind., are members of the board of directors of the Indiana Independent Telephone Association and have for many years been active in Independent telephone affairs in Indiana. Through an inadvertence their names were omitted from the list of directors given in the report of the annual convention of the Indiana association in last week's issue of TELEPHONY.

C. J. WILEY, of St. Joseph, Mo., has been made manager of the Home Telephone Co., of Scottsville, Kan.

J. A. BROWN recently resigned his position as manager of the Western Electric Telephone Co., at Algona, Iowa.

W. C. WHALEY, of Mason City, Iowa, has been appointed manager of the Western Electric Telephone Co., at Algona, Iowa.

C. W. MAGEE, of Pikeville, Ky., has been appointed manager of the Whitesburg (Ky.) Telephone Co., succeeding Adam Q. Ramey.

ORLEY OHLS, manager of the Home Telephone Co., of Scottsville, Kan., for several years, recently resigned to accept a position with the Pan-American Sales Co., with headquarters in Salina, Kan.

THOMAS S. BROWN, district manager of the Central Union Telephone Co., at Kankakee, Ill., has been made manager of the Rock Island district.

J. W. CARTER, of Searcy, Ark., has been transferred to Warren, Ark., as local manager of the Southwestern Telegraph & Telephone Co. in that city.

E. J. HOWELLS, district manager of the Central Union Telephone Co., at Jacksonville, Ill., has been transferred to a similar position at Kankakee, Ill.

A. L. TAYLOR, plant chief of the Central Union Telephone Co., at Jacksonville, Ill., has been promoted to the position of district manager at Jacksonville.

R. QUIMBY, for the past 14 years connected with the Central Union Telephone Co., in Kewanee, Ill., has been appointed manager of the Galva (Ill.) Telephone Co.

RAYMOND WETTON, of Dover, Tenn., has been appointed manager of the Trenton (Ky.) exchange of the Christian-Todd Telephone Co., succeeding J. W. Shaw.

WILLIAM FORCE, of Harvard, Mich., has been appointed manager of the local exchange of the Citizens Telephone Co., at Grandville, succeeding Martin DeLainey, resigned.

J. S. YOUNG has succeeded R. M. Morris as local manager of the Mountain States Telephone & Telegraph Co., at Durango, Colo., Mr. Morris having been transferred to Denver.

C. W. ARTHUR, of Brandon, Hill county, Texas, has purchased the holdings of Ed. Glober in the Roxton Independent Telephone Co., of Petty, Texas, and has taken charge as manager.

E. B. CARLEY, superintendent of the Maui Telephone Co., Maui, Hawaii, was a recent visitor at TELEPHONY's office. Mr. Carley is returning to Hawaii after a three months' visit to the states.

E. T. RUCKS, formerly manager of the Southwestern Telegraph & Telephone Co., at Warren, Ark., has been transferred to Newport, Ark., where he will have charge of the company's local exchange.

L. N. BREEDING, of the Dallas (Texas) office of the Southwestern Telegraph & Telephone Co., has been appointed manager of the Wichita Falls (Texas) exchange to succeed H. D. Phillips, who has been manager since 1913. Mr. Phillips is retiring on account of ill health.

A. J. BEVERLIN, Rock Island (Ill.) district manager of the Central Union Telephone Co., has been appointed assistant to General Manager C. H. Rottger. Mr. Beverlin's work will take him to all points in the jurisdiction of the company, but he will continue to make his home in Rock Island.

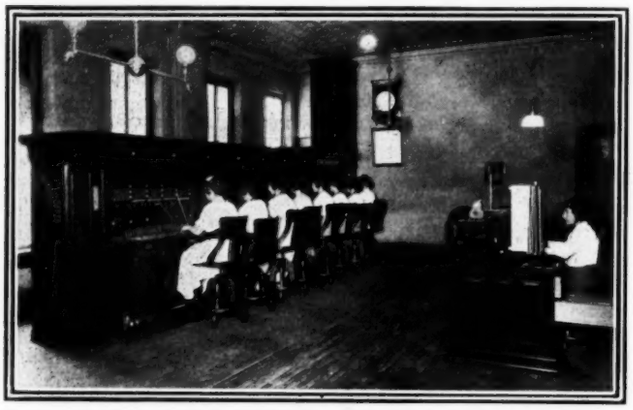
T. W. NYBERG, manager of the Galva (Ill.) Telephone Co. for the past 20 years, recently resigned his position. For the past few years Mr. Nyberg has been interested in the Galva Bottle Works and in order to devote more of his time to that business, he severed his connections with the telephone company.

From Factory and Salesroom

Conventions: Illinois Independent Telephone Association, Springfield, November 15-17; United States Independent Telephone Association, Chicago, December 5-8

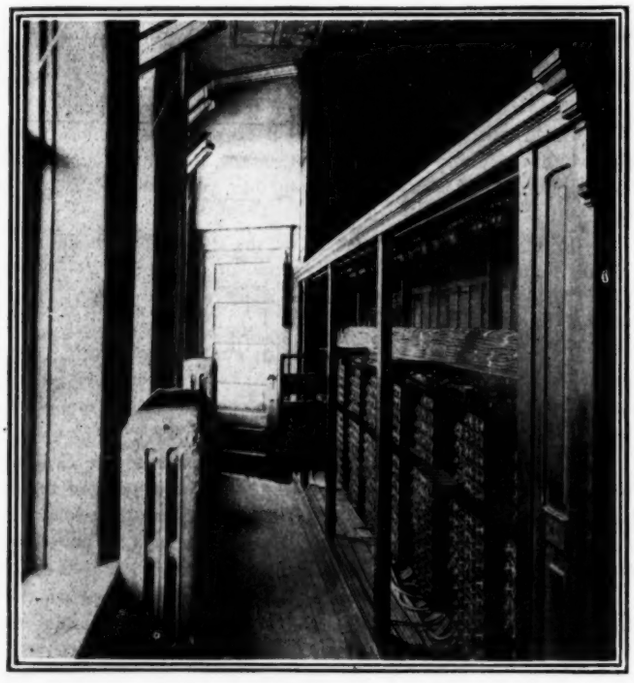
Automatic Service Features Installed at Mt. Vernon, O.

The central office equipment of the Mt. Vernon Telephone Co., of Mt. Vernon, Ohio, two views of which are reproduced in the accompanying illustrations, consists of a nine-position common battery multiple switchboard and chief operator's desk.



Operating Room of the Mt. Vernon (Ohio) Telephone Co.

This equipment was originally installed by the Dean Electric Co. in 1907. During the latter part of 1915 the Mt. Vernon company contracted with the Garford Mfg. Co.—now the Stromberg-Carlson Telephone Mfg. Co.—for the rehabilitation of its main switchboard. This work embraced the installation of all late automatic service features, automatic intermittent ma-



Rear View of Switchboard at Mt. Vernon, Ohio.

chine ringing, automatic disconnect, instantaneous recall, secret service, call distribution and automatic call recording.

The installation of such service features produces what is believed to be the highest class telephone service obtainable and admits of getting the maximum amount of service from a switchboard. These labor-saving elements allow the operators to handle more calls than otherwise. Fewer operators are thus required to handle the present switchboard at Mt. Vernon, without in any way impairing the efficiency of the service.

The splendid feature of accessibility prevails to a most satisfactory extent in the Mt. Vernon exchange, as may be seen by reference to the accompanying rear view of the switchboard, showing the relays, swinging relay gate, cables and general equipment layout. A quick and easy means of access is afforded to every working part.

The rehabilitation of a number of existing common battery plants is now under way by the Stromberg-Carlson company, employing the late automatic service features.

Desk Type Switchboards.

In small exchanges when it is necessary for switchboard attendants to do considerable writing and "book work," a desk type board of some kind becomes necessary. Meeting this condition to suit all users has been one of the most

Kellogg Arrangement for Performing Clerical Work at Board.

vexatious problems with which manufacturers have had to contend. The custom has been to furnish a flat top desk usually equipped with one pedestal of drawers. A turret or top was provided for the accommodation of the line circuit equipment with flush hinged key shelves for the cord circuit apparatus.

Such an equipment involves special work. When completed there is very little convenient writing space left, as the keys and plugs have usurped most of it, while the use of a typewriter or record books between calls in slack times is wholly out of the question.

The Kellogg company considers that what is needed is a desk in addition to a switchboard, and that the old turret arrangement simply means going to great expense to ruin a desk for its intended use. The Kellogg solution of the matter is shown in the accompanying illustration. It shows a standard, low key-shelf switchboard attached to which is an ordinary desk or table arranged at right angles to the switchboard, while the operator sits in the corner thus formed, and has everything at her finger tips.

The convenience of this arrangement has to be tried out

to be appreciated. The manufacturer contends that it is the ideal and proper arrangement for small exchanges or for a toll or chief operator's desk in medium-sized magneto exchange where the chief operator can "boss things" and do book work at the same time, or when it is desired to switch the toll lines to the local board after the morning rush is over and let the toll girl serve as a combined chief operator and accountant.

In general, whenever it is necessary for any switchboard attendant to do considerable clerical work, it is claimed that the purchase of a standard low key-shelf Kellogg switchboard and a plain, inexpensive table or desk, arranged in this manner, will afford a better and more satisfactory arrangement than will a desk and turret and key equipment. The Kellogg Switchboard & Supply Co., Chicago, will send folders describing this equipment, on request.

New Bulletin on Central Energy Telephones.

The Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y., is distributing to the trade a new "Edition H-A, 1,010" bulletin covering central energy telephones. This bulletin contains a number of diagrams of circuit arrangements and numerous illustrations and wiring diagrams of various types of central energy instruments.

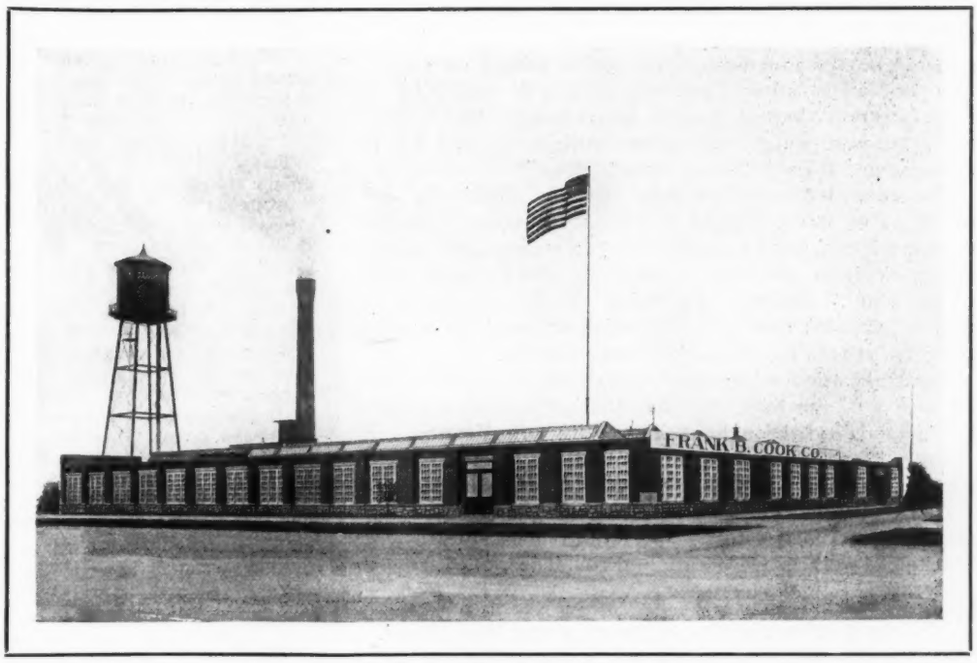
In addition to the complete information covering this equipment, the bulletin also contains the complete price list, code numbers and other information of that nature that telephone men will be interested in. Copies will be forwarded promptly to interested parties on receipt of their request.

The Factory of the Frank B. Cook Co.

One of the most modern manufacturing plants in the telephone industry is that of the Frank B. Cook Co., at Zion City, Ill. Until a couple of years ago the plant of this concern was located on West Lake street, Chicago, where it remained for so many years that it became almost a landmark. But in order to provide for the expansion of the business, it became necessary to seek out a new location and Zion City was finally selected because of its numerous advantages.

The new plant is unusually well built, the main portion being of the well-known saw-tooth construction, insuring an abundance of light. And in manufacturing articles requiring as careful construction as the Cook line of protective material, an abundance of light is a manufacturing necessity. The illustration shows that the plant has light and also room for expansion to take care of increased business in the years to come.

Although the plant of the Frank B. Cook Co. is located at Zion City, Ill., and all shipments are made from that point, the general offices of the company are located at 326 West Madison street, Chicago, to which point all correspondence should be addressed.



Plant of the Frank B. Cook Co. at Zion City, Ill.

Gund Anchors to be Used at Panama Canal.

The Gund Mfg. Co., of La Crosse, Wis., has just filled an order for a very substantial quantity of No. 2 Drive & Twist anchors which will be used in finishing up the work at the Panama Canal. These anchors are of the Gund company's latest type with drop-forged eye and drop-forged point and will be used in practically every kind of soil conditions, including swamps, sand, gumbo, gravel and rocky soil.

A New Intercommunicating Telephone System.

The Screw Machine Products Corporation, of Providence, R. I., is placing on the market a new interior telephone service known as the Select-o-phone. The system was designed by an engineer of long experience and a thorough personal knowledge of all present day methods of intercommunication and it is claimed that the Select-o-phone has overcome every disadvantage of old style systems.

Select-O-Phone.

A complete service has been installed and in operation for over a year at the plant of the Metal Products Corporation in Providence, and installations are now being made in many other representative concerns throughout the country.

The Select-o-phone switchboard is automatic, requiring no operator. Three ordinary bell wires radiate from the central station to each instrument installed. Any station can call any other station simply by turning a small dial on the telephone base to the number desired. The connection and ring are automatic as soon as the receiver is lifted. The switchboard is said to be trouble-proof. The lower part contains all terminals for the switchboard wiring and line connections, while the upper part contains the selectors which operate automatically with the dial on the telephone base.

One important feature of the Select-o-phone is the general call by means of which the party wanted is reached

immediately when he is away from his own station. The general call reaches the party wherever he may be in the plant. To operate, the dial is moved to general call and a pre-arranged signal sounded throughout the plant, hearing which the party answers from the nearest Select-o-phone station.

The Select-o-phone gives 24 hours' service. In case of overtime work and emergencies such as fire, burglary, etc., it is at the instant service of anyone in the plant. Furthermore, the use of the Select-o-phone frees the outside telephone service from interior calls—an important saving, as investigation shows the number of interior calls to average 50 per cent. or more of the total calls in any plant. Should an executive desire a conference with two or more departments, the Select-o-phone gives him this service.

He calls the parties wanted in conference and asks them to connect at the conference point. Then by connecting his own instrument also, he has an immediate conference without taking any man away from his department, and without wasting time waiting for the men to walk from their offices to his. While the conference is in progress, no one can get the executive on the line as any attempt to ring his number gives the busy signal.

The installation of the Select-o-phone is said to have resulted in freeing outside telephone lines from personal conversations to the betterment of the outside service. A saving is also effected by the automatic feature of the Select-o-phone which makes it necessary for the operator to attend only to outside calls, devoting the time saved to clerical or stenographic work. If, during a conversation on an outside wire, information from a certain department is needed to complete the conversation, it may be secured quickly and privately by using the Select-o-phone while the party waits on the outside line.

New stations may be added to the Select-o-phone system from time to time as desired without disturbing any of the previous wiring. Since the central station is constructed on the unit basis, any trouble arising on one line does not affect other lines. In fact, it is stated by the manufacturers that no trouble can arise on the Select-o-phone system which cannot be quickly repaired by the manufacturers' own "handy man."

The executive saves his own time and that of his subordinates by using the Select-o-phone to summon a clerk, dictate a letter, ask a question or issue a command, whether the party is in the next room or in the farthest corner of the plant. Business men using the Select-o-phone say that it increases their personal efficiency, and by speeding them up, speeds up their whole organization.

Communication with every department is made so easy by means of the Select-o-phone that an executive radiates his personality throughout his entire organization. He literally keeps his business at his finger tips, increasing his personal efficiency and that of every member of his force.

An attractive booklet on "Personal Power Transmission" is being mailed to executives on request by the Screw Machine Products Corporation, Providence, R. I.

Special Anchor for Use in Swamps and Wet Places.

The Gund Mfg. Co., of La Crosse, Wis., is now manufacturing a special Drive & Twist anchor for use in swamps and extremely wet places. It is nine feet long, has a 12-inch span of blades and a 7/8-inch shaft. This anchor, it is said, can be used very nicely in river beds, through peat bogs and into subsoil. The Gund company is furnishing these anchors to a number of telephone companies in Florida, Minnesota and New York and is now prepared to fill orders as quickly as received.

Paragraphs.

A. J. Briggs and G. A. Briggs, of the Chicago Telephone Supply Co., of Elkhart, Ind., motored home from Los Angeles, Cal., early in September. They followed the Santa Fe trail across California, Arizona, New Mexico, Colorado, Kansas, Missouri, Illinois and part of Indiana.

The "Golden Calf" of Precedent.

The dissenting opinion of Judge Scott, of the Colorado Supreme Court, in the case of Van Kleeck vs. Ramer, protests vigorously against the tendency of the courts to slavishly follow precedent and says, inter alia:

"Precedents that find support in sound reason, and tend to promote justice, are strongly persuasive and generally to be followed; but precedents not so supported, or when for any cause the reason for the rule has ceased to exist, obstruct progress, and should be discarded as being both unjust and dangerous. The tendency of courts to so generally rely on case law, regardless of existing reasons that may appeal for righteous judgment, is fast becoming a menace to our government.

I may be permitted to suggest, for the consideration of courts and judges who feel impelled to sacrifice their sense of reason and justice upon the altar of the golden calf of precedent, the quaint philosophy of Sam Walter Foss, in the following lines:

One day through the primeval wood a calf walked home, as good calves should; but left a trail all bent askew—a crooked trail, as all calves do. Since then 300 years have fled, and, I infer, the calf is dead; but still he left behind this trail, and thereby hangs my moral tale.

The trail was taken up next day by a lone dog that passed that way; and then a wise bell-wether sheep pursued the trail o'er vale and steep. And drew the flock behind him, too, as good bell-wethers always do; so from that day, o'er hill and glade, through those old woods a path was made.

And many men wound in and out, and bent and turned and dodged about, and uttered words of righteous wrath, because 'twas such a crooked path. But still they followed—do not laugh—the first migrations of that calf, and through this winding woodway stalked because he wabbled when he walked.

This forest path became a lane, that bent and turned and turned again. This crooked lane became a road, where many a poor horse, with his load, toiled on, beneath the burning sun, and traveled some three miles in one, and thus a century and a half they trod the footsteps of that calf.

The years passed on with swiftness fleet, the road became a village street; and this, before men were aware, a city's crowded thoroughfare. And soon the central street was this of a renowned metropolis; and men two centuries and a half trod the footsteps of that calf. Each day a hundred thousand route followed the zigzag calf about, and o'er his crooked journey went the traffic of a continent. A hundred thousand men were led by one calf near three centuries dead—they followed still his crooked way, and lost 100 years a day.

For thus such reverence is lent to well-established precedent. A moral lesson this might teach were I ordained and called to preach. For men are prone to go it blind along the calf-paths of the mind, and toil away from sun to sun to do what other men have done. They follow in the beaten track, and out and in and forth and back, and still their devious course pursue to keep the path that others do. But how the wise old wood-gods laugh, who saw the first primeval calf! Ah, many things this tale might teach, but I am not ordained to preach."

Public service commissions of the various states are now engaged in making a trail through the "primeval wood" of regulation of public utilities. Unlike the calf of which Mr. Foss writes, they are, however, taking it all in all, blazing a straight and well-defined trail. The task of the commissions has been an arduous one, as there were many treacherous morasses and apparently impenetrable jungles of divergent interests through which they had to carry the trail to the great plain beyond, upon which there is room for both the public and the corporations which serve it to stand side by side, recognizing that each has rights which must be conserved, and that "regulation" is the best and surest method of insuring the conservation of these rights.

Record of Telephone Patents Recently Issued

1,195,234. August 22, 1916. COIN-REGISTERING DEVICE FOR TELEPHONES; H. Kramer, New York. A registering device consisting of a numeral carrier is placed adjacent to the coin chute of a pay station telephone. Means to operate the registering device are controlled by the depositing of a coin and an auxiliary receiver hook which engages the telephone receiver is arranged to control the operation of the numeral carrier operating means when the receiver is taken from the hook.

1,195,499. August 22, 1916. AUTOMATIC FIRE ALARM; G. B. Rattermann and W. W. Garrison, Birmingham, Ala. Telephonographic mechanism is associated with automatic signal producing means responsive to fire conditions for reproducing a phonograph record and transmitting the reproduced sounds to a distance.

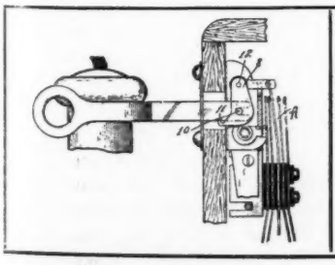
1,195,589. August 22, 1916. CALLING DEVICE; W. Kaisling, Chicago; assigned to Kellogg Switchboard & Supply Co. In this calling device for a two-wire metallic line system a numbered indicating dial is provided for a setting member having a plurality of operating positions. The dial is advanced each time the calling device is operated, according to the actuation of the setting member, and remains in the advanced position until the next operation of the device.

1,195,590. August 22, 1916. TELEPHONE SWITCHHOOK; W. Kaisling, Chicago; assigned to Kellogg Switchboard & Supply Co. The mounting frame of this switchbook is of sheet metal and has elongated side pieces. An attaching flange extends laterally from one of the side pieces which form a groove adapted to receive the switchhook at one end and a switch-spring attaching member at the other end, between them. The spring attaching member may be adjustably clamped between the side pieces.

1,195,771. August 22, 1916. AUTOMATIC TELEPHONE EXCHANGE SYSTEM; G. A. Betulander, Sodertorns Villastad, Sweden, and N. G. Palmgren, Stockholm, Sweden; assigned to Relay Automatic Telephone Co., London, England. In this automatic system connection is effected by means of relays only. In each group-switching section is a plurality of numerical groups of outgoing lines to any one of which each of a number of incoming lines is adapted to be connected. Intermediate trunk lines are provided between the incoming and outgoing lines and have at their disposal different lines of each numerical group. Connecting relays are provided for effecting connections at both ends of the intermediate lines. There is a plurality of common group selectors and relays for connecting the incoming lines with the connectors.

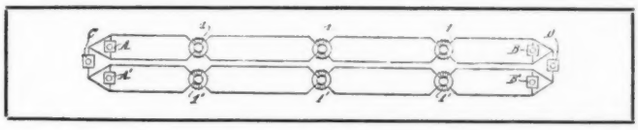
1,195,891. August 22, 1916. SEMI-AUTOMATIC TELEPHONE EXCHANGE SYSTEM; W. Aitken and R. Aitken, London, England. In this system trunk lines extend from one exchange to a plurality of other exchanges. An automatic numerical switch is provided for selecting the trunk lines. Jacks associated with a trunk line leading to the automatic switch have connected with it automatically-operated calling means arranged so that plugging into any particular one of the jacks determines the operation of the automatic switch and thereby the trunk line selected, leading from the exchange to one of the other exchanges to which the called subscriber's line is connected.

1,196,273. August 29, 1916. CROSS ARM SADDLE; C. L. Peirce, Jr., Pittsburgh, Pa.; assigned one-half to Hubbard & Co. This metal saddle plate comprises a grounded body part for engaging with the rounded top of the arm. It has downwardly extending sides for engaging with the sides of the arms to strengthen it against splitting. The central part of the rounded top of the plate is raised just enough to form a flat seat for the base of the insulator pin, there being a hole at the center for registering with a pin hole through the arm for receiving the shanks of the insulators.



No. 1,195,590.

1,196,277. August 29, 1916. LOADING COIL FOR PHANTOM CIRCUITS ON AERIAL LINES; H. B. M. Pleijel and A. A. Olsson, Stockholm, Sweden. Induction coils wherein stray fields are produced by the currents of the duplex connection in an overhead duplex line loaded according to the Pupin system, the main line being loaded by double coils, are inclosed in non-conducting and non-hydroscopic casings. Main lines are, by means of the stray fields, loaded as branches of the duplex line.



No. 1,196,277.

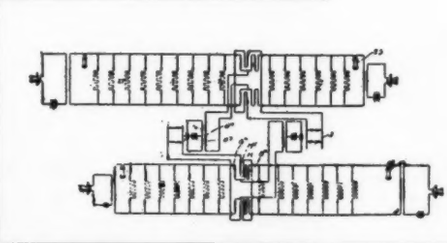
1,196,300. August 29, 1916. MEANS FOR MINIMIZING INDUCTIVE INTERFERENCE; C. F. Scott, New Haven, Conn.; assigned to Westinghouse Electric & Mfg. Co., Pittsburgh, Pa. This patent relates to inductive interference from electric railway systems. Provision is made to impress electromotive forces at intervals in the track rails so that the inductive effects arising from the current flow in the trolley conductors may be substantially neutralized by confining the return current flow to the track rails.

1,196,323. August 29, 1916. TELEPHONE SIGNALING SYSTEM; J. S. Allen, Chicago; assigned to Kellogg Switchboard & Supply Co. A listening key is provided for each of the cord circuits in this system, there being a key common to all the cord circuits. Actuation of a listening key and the common key will connect ringing current to the answering terminal of the cord circuit. Contacts, controlled by the common key, prevent ringing current from traversing the calling terminal of the cord circuit.

1,196,340. August 29, 1916. RECEIVER-OPERATED SWITCH FOR TELEPHONES; H. D. Currier, Chicago; assigned to Kellogg Switchboard & Supply Co. A device for holding a watch-case type of receiver is described. A plate covering an orifice or opening which is adapted to hold the receiver is secured to the inside wall of the casing. Provision is made for supporting the receiver against the outside of the plate so that it may be laterally removed and replaced. Contacts, supported upon the inside of the wall, are operated by the receiver when it is moved laterally.

1,196,398. August 29, 1916 TELEPHONE KEY; P. O. Robinson, Concord Junction, Mass. This key comprises two pairs of circuit closers having an actuator mounted to slide and swing relative to them so that it may be swung into operative relation with one pair of closers and into contact with the other pair. It is intended for use on party lines.

1,196,482. August 29, 1916. AUTOMATIC SELECTOR SWITCH; J. N. Reynolds, Greenwich, Conn.; assigned to Western Electric Co. Electromagnetic means are adapted to actuate an idler roller to force a brush carrier into engagement with a continuously-moving member to drive the carrier in one direction. A second idler roller in operative relation to the continuously-moving member and carrier through electromagnetic means is caused to transmit motion from the continuously-moving member to the carrier to drive it in the opposite direction.



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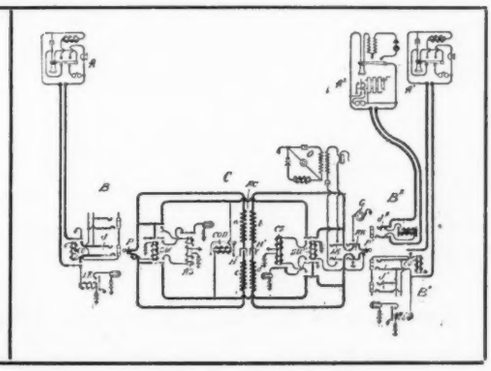


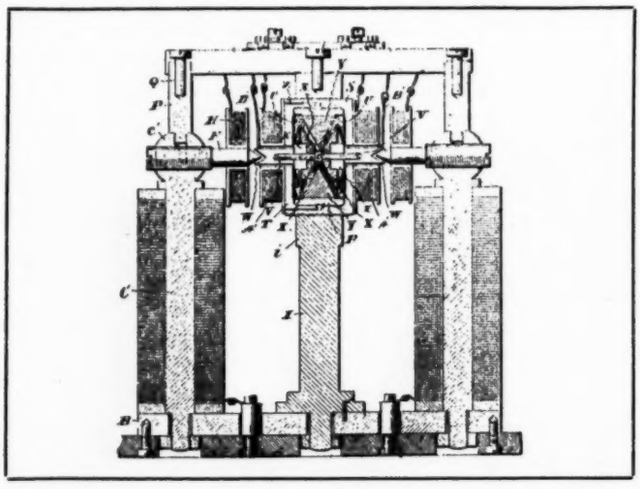
No. 1,197,163.

1,196,532. August 29, 1916. AUTOMATIC TELEPHONE EXCHANGE SYSTEM; B. G. Dunham, Hawthorne, N. J.; assigned to Western Electric Co. In this two-wire machine switching telephone system a stepping relay, operated by a sender, is associated with a selector. The relay controls a primary stepping circuit while a slow-acting relay controls a secondary stepping circuit and at its armatures and back contacts, a release circuit for the selector. A circuit for this relay is closed at the armature and front contact of the stepping relay while a contact controlled by the selector shaft transfers the control of the slow-acting relay to the back contact of the stepping relay.

1,196,562. August 29, 1916. TELEPHONE INSTRUMENT; H. E. Lynch, Brooklyn, N. Y. A combined transmitter and receiver of the desk stand type is described. An amplifying horn is placed upon the upper end of a hollow standard and at right angles thereto. A transmitter is centrally arranged in the large end of the horn, while a receiver magnet is placed in the hollow standard. A casing is secured to the core of the magnet and a diaphragm supported by the casing at the small end of the horn.

1,196,761. September 5, 1916. TELEPHONE SYSTEM; H. P. Clausen, Mt. Vernon, N. Y.; assigned to Western Electric Co. The feature of this system is the provision of a source of ringing current associated with the cord circuit and adapted to be impressed upon the line of the called subscriber. A ringer, operated by the ringing current, has a telephonic element associated with it which is inductively connected with the talking strand of the cord circuit. The calling subscriber may thus be given the sound of a bell ringing when the ringing current is applied to the called line.

1,196,793. September 5, 1916. AUTOMATIC TELEPHONE EXCHANGE SYSTEM; A. E. Lundell, New York; assigned to West-



No. 1,198,212.

ern Electric Co. A stepping relay is associated with the selector in this machine switching telephone system. A slow relay is controlled by the stepping relay and constructed and arranged to remain inoperative while the sender is operative and to operate when the intermittent actuation of the stepping relay is discontinued.

1,196,798. September 5, 1916. CABLE HANGER; R. Magle, Logan, Ohio. This cable hanger is made of a strip of flexible material having an apertured end, the opposite end thereof having a spring tongue struck therefrom and slidably engagable with the aperture.

1,196,847. September 5, 1916. PAY STATION TELEPHONE SYSTEM; C. J. Erickson, Chicago; assigned to Automatic Electric Co. Toll devices are located at the subscriber's stations for preventing the use of the telephone by calling subscribers except when the proper toll is assessed at the calling substation.

1,196,876. September 5, 1916. AUTOMATIC TELEPHONE AND SUPERVISORY SYSTEM; F. Lubberger, Chicago; assigned to Automatic Electric Co. A relay, normally bridged between the positive and negative terminals of a battery at the sub-exchange, controls over a trunk line a normally energized relay at the main exchange.

1,197,048. September 5, 1916. MACHINE TELEPHONE SWITCHING SYSTEM; W. H. Matthies, Antwerp, Belgium; assigned to Western Electric Co. A plurality of automatically operable multi-position switches adapted to be brought one after another into association with a control circuit are set by a series of short impulses. A single slow-acting relay associated with the control circuit, responds to a prolonged closure thereof to produce the changeover from one of the switches to the next to be set and responds to a prolonged interruption of the circuit to produce the restoration to normal of the switches.

1,197,163. September 5, 1916. TELEPHONE SYSTEM; R. I. Utter, Chicago; assigned to Kellogg Switchboard & Supply Co. In this universal cord circuit a switching relay is associated with each of the answering and calling terminals. It is adapted to be operated when connection is made with a telephone line of one character but not one of another. Supervisory apparatus is associated with each set of talking conductors. Circuit connections are controlled by the switching relay so that when two lines of one character are connected, one set of talking conductors is effective and when two lines of other but like character are connected, the other set of talking conductors is effective.

1,197,185. September 5, 1916. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to James R. Garfield, Cleveland, Ohio. In this system connective links having automatic switches for interconnecting lines are provided. A motor is associated with the links and adapted for synchronous movement with the automatic switch of any link in one direction only. Selectively adjustable circuit controlling means form part of and are governed by the motor in its movement. The circuit controlling means may be adjusted to the automatic switch at a predetermined point.

1,197,989. September 12, 1916. AUTOMATIC TELEPHONE SYSTEM; C. S. Winston, Chicago; assigned to Kellogg Switchboard & Supply Co. The feature of this system is a quick-acting release relay having an energizing circuit closed responsive to the initial energization of the primary relay and interrupted responsive to the primary relay operations. A second energizing circuit of comparatively low current value and continuous flow is provided for the release relay. The release relay is closed and held closed during the period of interruptions of its first energizing circuit.

1,197,990. September 12, 1916. AUTOMATIC TELEPHONE SYSTEM; C. S. Winston, Chicago; assigned to Kellogg Switchboard & Supply Co. In this system the energizing circuit for the quick-acting release relay includes a winding of the relay, a normally open off-normal contact and a normally closed contact of the primary relay. A second circuit for the secondary relay includes a normally open contact, a second winding and a comparatively low voltage source of current so that the secondary relay may maintain its armature attracted when its first circuit is closed and interrupted by the primary relay for short periods only.

1,198,005. September 12, 1916. TOLL TELEPHONE SYSTEM; A. E. Case, Marion, Ind.; assigned to Delta Electric Co., Marion, Ind. An automatic metering system is covered by this patent. The meter and its operating means at the substation are set when the line is connected at the exchange. Disconnections of the line by the exchange operator when the receiver is off the switch hook at the substation will operate the meter-operating means without counting the calls. There are 35 claims to this patent.

1,198,212. September 12, 1916. TELEPHONE REPEATER; E. Grissinger, Buffalo, N. Y.; assigned to the American Telephone & Telegraph Co., New York. In this repeater, magnets with poles opposite to each other, have their magnets in inductive relation with the telephone circuit. A casing is placed between the poles and diaphragms extend across it opposite the poles. A rod carrying armatures extends through the diaphragms. An electrode is secured to the rod while another electrode has an aperture through which the rod freely passes. The construction is such that a second telephone circuit can be influenced by the electrodes. The patent has 84 claims.

1,198,213. September 12, 1916. TELEPHONE REPEATER; E. Grissinger, Buffalo, N. Y.; assigned to American Telephone & Telegraph Co., New York. This is a modification of the preceding patent. Rollers between which the magnet is held are movable toward or from the magnet. The magnet's armature has arms corresponding to its pole pieces and provision is made for adjusting the magnet longitudinally toward or from the arms.

1,198,214. September 12, 1916. TELEPHONE SYSTEM. E. Grissinger, Buffalo, N. Y.; assigned to American Telephone & Telegraph Co., New York. A two-way telephone repeater is described. One limb of a three-limb induction coil is in circuit with the repeater and another limb is in the telephone circuit. Means for balancing the telephone circuit comprise another circuit which includes the third limb of the induction coil. An operator's telephone set is located at the remote end of the balancing circuit symmetrically with respect to the telephone set at the remote end of the telephone circuit.

1,198,345. September 12, 1916. TELEPHONE TRANSMITTER; F.

"In my experience with (——) telephones I found it necessary to carry at least 5 or 6 different types of repair parts. You can see what I had to contend with and why I so appreciate Monarch."

The above is an extract from a letter just received from a man who has had experience with telephones of several makes and is now satisfied to standardize on

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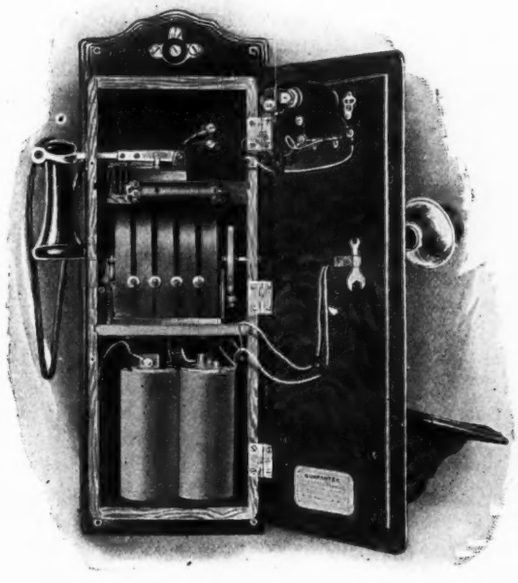

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Grissinger, Buffalo, N. Y.; assigned to American Telephone & Telegraph Co., New York. In this transmitter a variable resistance electrode is vibrated by the voice waves. Means are provided for imposing upon this electrode and the parts moving therewith, a high natural frequency which is above the resonating period of the voice waves to be transmitted. These means comprise a wire suspension and tensioning means for putting it under a degree of tension suitable to accomplish the purpose stated.

1,198,695. September 19, 1916. MOTOR TO CONTROL AUTOMATICALLY A SUBSCRIBER'S TELEPHONE FOR VARIED SERVICE; E. V. M. Brennan, Philadelphia, Pa. A phonograph and registering means to be used in connection with a desk stand telephone are described. A contact is actuated by the clapper of the ringer of the subscriber's telephone to operate a motor. A lever arm is actuated by the operation of the motor to lift the receiver so as to establish the line circuit. The same operation of the lever arm and motor actuates a registering device and also cuts the phonograph and a timing device into circuit.

1,198,765. September 19, 1916. TELEPHONE ATTACHMENT; W. W. Rainwater, Crews, Texas. A switch for cutting the transmitter battery in or out of circuit is described. It consists of a pair of spaced plates secured to the side of the instrument casing. A button is slidable between the plates which are in the battery circuit. When the button contacts with both of the plates, the circuit to the battery is completed.

Telephone Man's Experience in Getting Out of Mexico

Exciting and Thrilling Experiences of C. W. Forbes, Operator of Telephone System in Hermosillo, Mexico, in Getting Out of That Country Enroute to the United States to Spend a Two Months' Vacation

C. W. Forbes, well known to Independent telephone men in the Middle West, who for a number of years has been operating a telephone system at Hermosillo, Mexico, has been in Chicago on his biennial vacation. Before he left to return to Mexico, Mr. Forbes jotted down an account of his lively experiences in that tormented country, and, while couched in language that for brevity compares to an official military report, it is plain that his narrative would easily furnish material for a stirring tale of peril in a savage land.

Think of running a telephone company on rentals that averaged five to eight cents a month! And the mercury standing at 110 most of the time! But there are always compensations. The Bell-Western Electric combination does not bother him much.

Mr. Forbes writes:

"In the month of August, 1915, all Americans were again ordered out of Mexico, and as the thermometer stood around 110 most of the time and telephone rentals averaged from five to eight cents in American money per month, I decided to take a vacation, and spend some of the surplus earnings. The railroad from Hermosillo to the north having been destroyed, the question was, how to get away?

An automobile trip to the border was considered. This meant traveling 178 miles through a country infested with hostile Yaqui Indians, and small bands of bandits, who had been killing and robbing in all directions, even entering the outskirts of the city and killing entire families, so the idea of the auto trip was abandoned. The Southern Pacific ran a mixed train south on August 25, so I decided to go to Guaymas and from there try and get a boat to San Francisco, but, on arrival, I found a boat had left Guaymas the day before and the chance of another boat in the near future was very remote.

On the morning of August 28 a small party of us chartered the Aldina, a sailing vessel equipped with a small auxiliary gasoline engine, aboard which we placed a gasoline launch, a row boat, a four days' supply of provisions and a quantity of water. The captain of the Aldina proposed that we go up the Gulf of California to Port Isabel (usually a two days' trip) and from that point take automobiles to the border, and, if for any reason, the automobiles were not at Port Isabel, take the gasoline launch and proceed up the Hardy river to Volcano lake, at which point there was a construction camp, going from there by automobile to the border.

Prospects for a pleasant trip were bright and on the night of the same day we sailed out of the Bay of Guaymas, which, by the way, is one of the most beautiful land-locked harbors in the world, and entered the Gulf of California. The waters of the bay had been calm and beautiful, but shortly after entering the gulf a stiff breeze sprang up, the sky became overcast, and we were in the midst of a storm such as is seldom witnessed in other than tropical countries. Parts of our sails were carried away before they could be reefed, and it was necessary to start the gasoline engine which caused so much smoke in the small cabin that we were forced to remain on deck throughout the storm.

The storm lasted for several hours, and one who has not been on the water under such conditions cannot imagine the experience we went through, being tossed about like a cork, thinking every minute would be our last. We weathered the storm and the morning sun found us all there, with all but the writer about as seasick as it is possible from human beings to be and live through it. An inventory showed that considerable baggage and part of our provisions had been washed overboard, resulting in a good feed for the fishes, but a sad outlook for the survivors.

Following the storm a dead calm set in, and for three days and nights we made only such speed as was possible with the aid of our gasoline engine. Although all were anxious to get out of the country the trip up the gulf was very interesting, many whales being sighted, also numerous schools of porpoises and sharks. One school of sharks followed us for miles as we neared the Tiburon, or Shark islands. The Tiburon islands are inhabited by a tribe of Seris Indians of the cannibal species and many an explorer visiting these islands has never been heard of and is supposed to have been killed and eaten by members of the tribe.

On the night of September 1 we arrived at Port Isabel expecting to find a settlement of fishermen, and hoping to find automobiles. Much to our disappointment the fishermen had left and no automobiles were in sight. We assumed that, due to the fact that we were three days late, the automobiles had returned and reported us lost, as afterwards proved to be the case, and friends mourned us as lost in the severe storm on our first day out.

Such effects as we had left, along with a small quantity of food, were stowed away in the launch and a start was made for the trip up the river, a distance of 65 miles, to the construction camp of Volcano lake.

At this point the river is several miles wide and at high tide very deep, but after a two-hour run we were in shallow water, due to the tide going out, and by mid-

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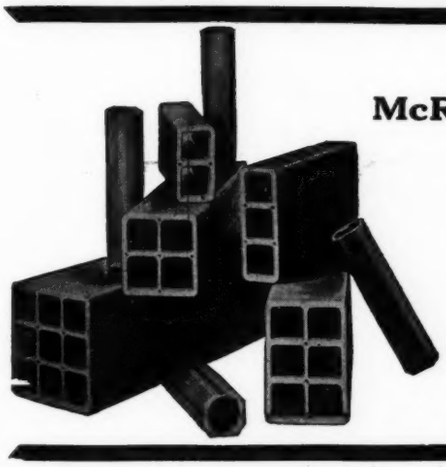

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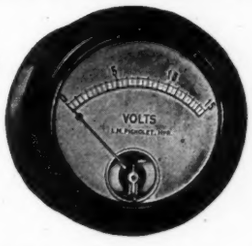

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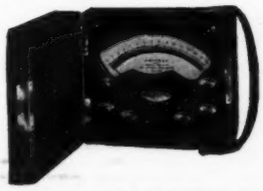

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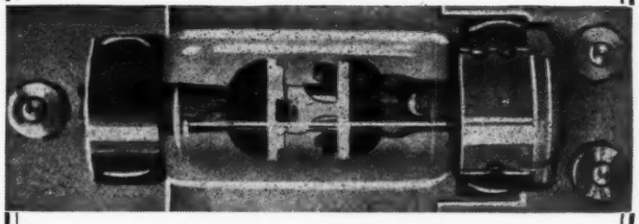
Lightning has yet to find a weak point in this



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Mansbridge Condensers are **More Reliable, Lighter, Smaller and no more Costly** than those of the old fashioned solid foil type.

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night the launch was on its side in a few inches of water and a great deal of mud. Such a night! Not a wink of sleep and only a small canteen of water. It was just a case of wait until morning and then wait for the tide to come in. They both came, but it seemed weeks instead of hours before the sun shone over the mountains. The last cracker was eaten that morning and we made an early start up the river. What a beautiful river it was! Flocks of scarlet and other bright-colored birds were to be seen on all sides, and a strange part was that they seemed to have no fear of us, often lighting on the launch

We made about 30 miles that day, but, due to the many turns in the river, made only about 15 miles in a direct line, so in reality we were but 15 miles from where we started in the morning, with nothing to eat and nothing to drink but river water, which still was a bit salty and a whole lot muddy. We had about decided to make camp for the night when one of the party sighted what looked to be a boat ahead. It proved to be a small boat belonging to the C. M. Co., a cattle company which had been operating in that section of the country. It sure looked good, and the two Mexicans who were aboard gave us our dinner. We remained there for the night, making an early start the next day. After going about five miles, we struck shallow water and rapids that we could not pass and we thought we might have to return to the Aldina.

A scouting party was formed, which started up the river to see what was ahead of us, and to try to locate a second boat of the C. M. Co., which we were told was somewhere in that locality. The boat was located about a mile farther up the river, and the watchman, a good natured German who had been left in charge, informed us that it would be impossible to go any farther north, due to the low water, which was always the case in August.

We were told that a few miles across the mountains we would find some Copapau Indians who had horses, and that for a consideration they would no doubt take us to the nearest point on the Southern Pacific Railroad, a distance of about 50 miles. We made a dinner of beans and coffee furnished by the kind hearted boatman and in the morning started to cross the mountains for the Indian settlement. By noon of that day we located the Indians, but they at first refused to take us to the railroad and it began to look like a case of walk, an almost impossible condition, as we afterwards learned that over 70 of a party of 100 Japanese had died trying to make the same trip on foot without guides.

Good American gold at last brought the Indians over to our way of thinking and after a good dinner of bread, beans and coffee we started on horseback to the border, or rather the nearest point on the railroad, and take it from me, that was some night's ride! But the day dawned and at 10 o'clock we were at the railroad just ten minutes too late for the train to Yuma, and it was a case of waiting until 5 o'clock in the afternoon for a train to Mexicali, with not even a cactus to keep off the sun, which would have broken a thermometer.

The train arrived at last and cold water never tasted as good as the water in the cooler on that train. In less than an hour's time we were in Mexicali and after passing the customs were across the line and in the American town of El Centro. The American flag and the U. S. A. will never look better to that little bunch of Americans than they did on that night of September 5, 1915.

TELEPHONY's readers will think that after such a trip getting out of Mexico one would never want to return, but after a two months' vacation in God's country, the writer was at the border town of Nogales waiting to get in again. That experience was in some ways even more interesting, but is another story.